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DEVICES AND METHODS FOR PLACEMENT OF PARTITIONS WITHIN A HOLLOW BODY ORGAN

Abstract:

Devices and methods for tissue acquisition and fixation, or gastroplasty, are described. Generally, the devices of the system may be advanced in a minimally invasive manner within a patient's body, e.g., transorally, endoscopically, percutaneously, etc., to create one or several divisions or plications within the hollow body organ. Such divisions or plications can form restrictive barriers within a organ, or can be placed to form a pouch, or gastric lumen, smaller than the remaining stomach volume to essentially act as the active stomach such as the pouch resulting from a surgical Roux-En-Y gastric bypass procedure. Moreover, the system is configured such that once acquisition of the tissue by the gastroplasty device is accomplished, any manipulation of the acquired tissue is unnecessary as the device is able to automatically configure the acquired tissue into a desired configuration.

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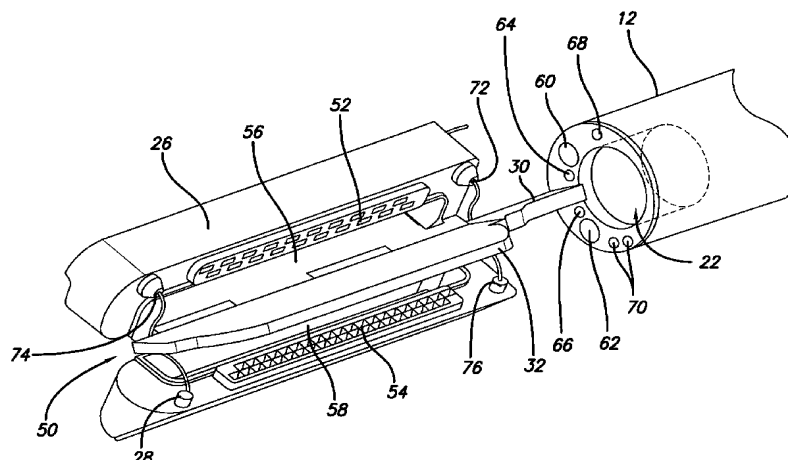
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(57) Abstract: Devices and methods for tissue acquisition and fixation, or gastropasty, are described. Generally, the devices of the system may be advanced in a minimally invasive manner within a patient's body, e.g., transorally, endoscopically, percutaneously, etc., to create one or several divisions or plications within the hollow body organ. Such divisions or plications can form restrictive barriers within an organ, or can be placed to form a pouch, or gastric lumen, smaller than the remaining stomach volume to essentially act as the active stomach such as the pouch resulting from a surgical Roux-En-Y gastric bypass procedure. Moreover, the system is configured such that once acquisition of the tissue by the gastropasty device is accomplished, any manipulation of the acquired tissue is unnecessary as the device is able to automatically configure the acquired tissue into a desired configuration.

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**DEVICES AND METHODS FOR PLACEMENT OF PARTITIONS**  
**WITHIN A HOLLOW BODY ORGAN**

**FIELD OF THE INVENTION**

5           The present invention relates generally to medical devices and methods. More particularly, it relates to devices and methods for creating a partition within a hollow body organ, particularly a stomach, intestinal tract, or other region of the gastrointestinal tract, and affixing the tissue.

**BACKGROUND OF THE INVENTION**

10           In cases of severe obesity, patients may currently undergo several types of surgery either to tie off or staple portions of the large or small intestine or stomach, and/or to bypass portions of the same to reduce the amount of food desired by the patient, and the amount absorbed by the gastrointestinal tract. The procedures currently available include laparoscopic banding, where a device is used to "tie off" or constrict a portion of the  
15 stomach, vertical banded gastroplasty (VBG), or a more invasive surgical procedure known as a Roux-En-Y gastric bypass to effect permanent surgical reduction of the stomach's volume and subsequent bypass of the intestine.

Typically, these stomach reduction procedures are performed surgically through an open incision and staples or sutures are applied externally to the stomach or hollow body  
20 organ. Such procedures can also be performed laparoscopically, through the use of smaller incisions, or ports, through trocars and other specialized devices. In the case of laparoscopic banding, an adjustable band is placed around the proximal section of the stomach reaching from the lesser curve of the stomach around to the greater curve, thereby creating a constriction or "waist" in a vertical manner between the esophagus and the  
25 pylorus. During a VBG, a small pouch (approximately 20 cc in volume) is constructed by forming a vertical partition from the gastroesophageal junction to midway down the lesser curvature of the stomach by externally applying staples, and optionally dividing or resecting a portion of the stomach, followed by creation of a stoma at the outlet of the partition to prevent dilation of the outlet channel and restrict intake. In a Roux-En-Y  
30 gastric bypass, the stomach is surgically divided into a smaller upper pouch connected to the esophageal inflow, and a lower portion, detached from the upper pouch but still connected to the intestinal tract for purposes of secreting digestive juices. A resected portion of the small intestine is then anastomosed using an end-to-side anastomosis to the

upper pouch, thereby bypassing the majority of the intestine and reducing absorption of caloric intake and causing rapid "dumping" of highly caloric or "junk foods."

Although the outcome of these stomach reduction surgeries leads to patient weight loss because patients are physically forced to eat less due to the reduced size of their stomach, several limitations exist due to the invasiveness of the procedures, including time, use of general anesthesia, time and pain associated with the healing of the incisions, and other complications attendant to major surgery. In addition, these procedures are only available to a small segment of the obese population (morbid obesity, Body Mass Index  $\geq$  40) due to their complications, leaving patients who are considered obese or moderately obese with few, if any, interventional options.

In addition to surgical procedures, certain tools exist for securing tissue such as the stapling devices used in the above-described surgical procedures and others such as in the treatment of gastroesophageal reflux disease (GERD). These devices include the GIA® device (Gastrointestinal Anastomosis device manufactured by Ethicon Endosurgery, Inc. and a similar product by USSC), and certain clamping and stapling devices as described in U.S. Pat. Nos. 5,403,326; 5,571,116; 5,676,674; 5,897,562; 6,494,888; and 6,506,196 for methods and devices for fundoplication of the stomach to the esophagus for the treatment of gastroesophageal reflux disease (GERD). In addition, certain tools, such as those described in U.S. Pat. Nos. 5,788,715 and 5,947,983, detail an endoscopic suturing device that is inserted through an endoscope and placed at the site where the esophagus and the stomach meet. Vacuum is then applied to acquire the adjacent tissue, and a series of stitches are placed to create a pleat in the sphincter to reduce the backflow of acid from the stomach up through the esophagus. These devices can also be used transorally for the endoscopic treatment of esophageal varices (dilated blood vessels within the wall of the esophagus).

There is a need for improved devices and procedures. In addition, because of the invasiveness of most of the surgeries used to treat obesity and other gastric disorders such as GERD, and the limited success of others, there remains a need for improved devices and methods for more effective, less invasive hollow organ restriction procedures.

#### SUMMARY OF THE INVENTION

Devices for tissue acquisition and fixation, or gastropasty, are described that may be utilized for creating a partition within a hollow body organ, such as the stomach, esophageal junction, and other portions of the gastrointestinal tract. Generally, the devices

of the system may be advanced in a minimally invasive manner within a patient's body, e.g., transorally, endoscopically, percutaneously, etc., to create one or several divisions or plications within the hollow body organ. Such divisions or plications can form restrictive barriers within the organ, or can be placed to form a pouch, or gastric lumen, smaller than the remaining stomach volume to essentially act as the active stomach such as the pouch resulting from a surgical Roux-En-Y gastric bypass procedure. Examples of placing and/or creating divisions or plications may be seen in further detail in U.S. Pat. No. 6,558,400; U.S. Pat. App. Serial No. 10/188,547 filed July 2, 2002; and U.S. Pat. App. Serial No. 10/417,790 filed April 16, 2003, each of which is incorporated herein by reference in its entirety.

The devices may be advanced within a body through a variety of methods, e.g., transorally, transanally, endoscopically, percutaneously, etc., to create one or several divisions or plications within a hollow body organ, e.g., to create a gastric lumen or partition to reduce the effective active area of the stomach (e.g., that which receives the initial food volume), performed from within the stomach cavity. The creation of this smaller gastric lumen may be achieved in a minimally invasive procedure completely from within the stomach cavity. Moreover, the devices are configured such that once acquisition of the tissue is accomplished, manipulation of the acquired tissue is unnecessary as the devices are able to automatically configure the acquired tissue into a desired configuration.

The devices may generally comprise a first acquisition member and a second acquisition member in apposition to one another along a first longitudinal axis, wherein optionally, at least one of the acquisition members is adapted to adhere tissue thereto such that the tissue is positioned between the first and second acquisition members, and optionally wherein at least one of the acquisition members is movable relative to the first longitudinal axis between a delivery configuration and a deployment configuration. Moreover, the system may also comprise a septum, or separator, removably positioned between the first and second acquisition members, wherein at least one of the acquisition members is movable relative to the septum between a delivery configuration and a deployment configuration.

A handle may be located at a proximal end of an elongate body or member and used to manipulate the device advanced within the hollow body organ as well as control the opening and clamping of the acquisition members onto the tissue. The elongate body may be comprised of a series of links, or of an extrusion fabricated with various lumens to

accommodate the various control mechanisms of the acquisition device. Similarly, the control mechanisms may be grouped together and sheathed in a thin skin sheath, such as a heat shrink. A working lumen may extend entirely through the elongate member and may be sized to provide access to the distal end for various surgical tools, such as an endoscope or other visualization device, or therapeutic devices such as snares, excisional tools, biopsy tools, etc. once the distal end of the assembly is positioned within the hollow body organ. The acquisition members may be joined to the elongate body via a passive or active hinge member, adaptable to position the assembly. The acquisition members may generally comprise a cartridge member placed longitudinally in apposition to an anvil member. The cartridge member may contain one or several fasteners, e.g., staples, clips, etc., which may be actuated via controls located proximally on the handle assembly. Moreover, the septum or barrier may be removably positioned between the cartridge member and anvil member and used to minimize or eliminate cross acquisition of the tissue into the cartridge member and/or anvil member.

Methods of placing a partition from within a hollow body organ using the devices disclosed herein generally comprise positioning a first acquisition member and a second acquisition member adjacent to a region of tissue within the hollow body organ, wherein the first and second acquisition members are in apposition to one another along a first longitudinal axis, adhering tissue from the region to each of the first and second acquisition members, and securing the adhered tissue between the first and second acquisition members. Such a method may also involve pivoting at least one of the acquisition members about the longitudinal axis to an open or closed configuration. Another method may also comprise removing a septum from between the first acquisition member and the second acquisition member.

While the device is in a delivery configuration, i.e., where the components of the distal working portion of the device (the cartridge member and anvil member) are disposed such that the cartridge and anvil are directly positioned into apposition about the septum. Once desirably positioned, one or both of the cartridge member and anvil member may be rotated about a pivot or translationally moved in parallel to one another. Then, portions of the stomach wall may be acquired by, or drawn within their respective openings. The configuration of the cartridge member and anvil member and the positioning of the device within the stomach are such that this tissue acquisition procedure also enables the devices to be self-adjusting with respect to the acquired tissue. Moreover, the devices are configured such that portions of the stomach wall are automatically positioned for fixation

upon being acquired and the tissue becomes automatically adjusted or tensioned around the perimeter of the distal working portion of the device in the stomach and within the distal working portion inner volume, to achieve the desired resulting geometry (e.g., small gastric pouch or restrictive partition or baffle). Because of the manner in which the tissue is acquired, the tissue intimately surrounds the cartridge member and anvil member to define or calibrate the subsequent volume of the resulting gastric lumen. Thus, the gastric volume may be predetermined by adjusting the volume of the cartridge member and anvil member, or the use of accessory devices such as a scope or balloon. As a result, once the desired volume is known and incorporated in the device, the user can achieve a controlled acquisition and without intraprocedural adjustments or positioning requirements.

The septum may act effectively as a barrier between the openings to facilitate the acquisition of the tissue to their respective openings while minimizing or eliminating cross acquisition of the tissue into the cartridge member and/or anvil member. In other alternatives, the septum may be omitted from the device and acquisition of the tissue may be accomplished by sequentially activating vacuum forces within the openings. Once the tissue has been acquired, the septum may be removed from between the cartridge member and anvil member by translating the septum distally or proximally of the cartridge member and anvil member or left within the stomach for later removal.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figures 1A and 1B show side and detailed side views, respectively, of one variation of an exemplary gastroplasty device described herein.

Figs. 2A and 2B show perspective detailed views of an exemplary gastroplasty device described herein.

Figs. 3A and 3B show perspective and end views, respectively, of a cross-sectioned portion of an exemplary gastroplasty device.

Figs. 4A and 4B show representative illustrations of how a gastroplasty device may be advanced transorally through the esophagus of a patient and positioned within the stomach cavity of a stomach.

Figs. 5A to 5D show end views of an example of how an exemplary gastroplasty device may be used to acquire and fasten tissue within a hollow body organ.

Fig. 5E illustrates a resulting fastened gastric lumen that may be formed using the gastroplasty devices described herein.



Figs. 5F and 5G demonstrate how a distal working portion of a gastroplasty device, and an inner volume, respectively, help to define the final configuration of the acquired tissue.

5 Figs. 5H and 5I show perspective and cross sectional views of illustrative tissue configurations that may be formed with the gastroplasty devices and methods described herein.

Figs. 6A and 6B show perspective and end views, respectively, of one variation of a gastroplasty device, wherein the septum is in position.

10 Figs. 7A and 7B show perspective and end views, respectively, of the device of Fig. 6A in an open configuration.

Figs. 8A and 8B show perspective and end views, respectively, of the device of Fig. 6A in an open configuration with the septum removed.

Figs. 9A and 9B show perspective and end views, respectively, of the device of Fig. 6A in a closed configuration.

15 Figs. 10A to 10C show end views of the cartridge member and anvil member during delivery, during tissue acquisition, and prior to clamping of the tissue, respectively, in one example of how a clamping cable may be routed with respect to an optional septum.

Figs. 11A and 11B show perspective and end views, respectively, of another variation of a suitable gastroplasty device.

20 Figs. 11C and 11D show perspective views of a gastroplasty device with and without a septum, respectively.

Figs. 12A to 12C show perspective views of yet another variation of a gastroplasty device.

25 Figs. 13A and 13B show cross-sectioned perspective and end views, respectively, of alternative acquisition pod assembly.

Figs. 13C and 13D show cross-sectioned perspective and end views, respectively, of the device of Figs. 13A and 13B under a high vacuum pressure.

Figs. 14A to 14D show perspective views of the operation of another variation of a gastroplasty device utilizing parallel pod motion.

30 Fig. 14E shows a cross-sectional perspective view of a portion of the pod members in an open configuration with a septum still in place between the cartridge member and anvil member.

Fig. 15 shows a perspective view of yet another variation of a gastroplasty device utilizing a translational trolley plate.

Figs. 16A to 16D show side, end, bottom, and perspective views, respectively, of a variation of a gastroplasty device, which utilizes a static acquisition pod.

Fig. 16E shows a bottom view of one variation of a gastroplasty device having an arcuate configuration.

5 Fig. 17 shows a perspective view of a device having an optional feature of projections or serrations which may be defined along the mating surfaces of the cartridge member and/or anvil member.

10 Figs. 18A and 18B show perspective and cross-sectional end views, respectively, of another optional feature of one or more rotatable shafts which may be integrated into the device.

Figs. 19A and 19B show perspective and detailed perspective views, respectively, of a device having a curved or adjustable segmented staple cartridge.

Figs. 20A and 20B show perspective views of a septum assembly having a tapered edge for facilitating removal of the septum from the hollow body organ.

15 Figs. 21A and 21B show perspective views of an alternative septum assembly having ribbed surfaces.

Fig. 21C shows a side view of one example of how collapse of the septum may be facilitated by withdrawing the septum into a receiving member.

20 Figs. 22A and 22B show perspective and end views, respectively, of a septum variation having at least two transverse septum members extending to opposite sides of the longitudinal septum member.

Fig. 23A illustrates an end view of an extendable septum assembly positioned between pod members and placed against stomach tissue.

25 Figs. 23B and 23C show side views of variations for extending the septum assembly from a low profile delivery to an extended deployed configuration.

Figs. 24A and 24B show end views of an alternative septum assembly which may be configured to deploy an extendable septum from a rolled-up configuration.

Figs. 25A and 25B show perspective views of an alternative septum assembly having a collapsible septum member.

30 Figs. 25C and 25D show end views of the septum of Fig. 25A in an expanded or extended configuration and in a collapsed configuration.

Figs. 26A to 26C show end, bottom, and perspective views, respectively, of yet another alternative septum having radiused corners.

Figs. 27A and 27B show perspective views of an alternative septum assembly having a low profile delivery configuration where the septum may be comprised of two elongate T-shaped members.

5 Figs. 28A to 28C show perspective views of an example of a clamping mechanism having two cam members.

Fig. 29A shows a perspective view of one example of how clamping cables may be routed through a gastropasty device described herein.

Fig. 29B shows a cross-sectioned end view of a parallel clamping device with the septum shown.

10 Figs. 30A and 30B show side and edge views of an alternative gastropasty device, utilizing linked pod members.

### DETAILED DESCRIPTION OF THE INVENTION

Gastropasty devices for tissue acquisition and fixation, and methods of using them are described. In general, the gastropasty devices described herein may be utilized for  
15 creating a partition within a hollow body organ, such as the stomach, esophageal junction, and/or other portions of the gastrointestinal tract. The gastropasty devices may be advanced within a body through a variety of methods, e.g., transorally, transanally, endoscopically, percutaneously, etc., to create one or several divisions or plications within the hollow body organ, e.g., to create a gastric lumen within the stomach. Further, the  
20 gastropasty devices may be assisted through the use of laparoscopic guidance, in particular, visualization of the external surface of the hollow body organ to assist in placement of the device, or within the organ cavity to monitor the procedure. Similarly, the devices of the present invention may be used in conjunction with other laparoscopic procedures, or may further be modified by an additional step or procedure to enhance the  
25 geometry of the partition. For example, upon placement of a partition of the present invention, it may be desirable to perform a secondary step either transorally, or laparoscopically, to achieve the desired gastropasty geometry, such as the placement of a single fold or plication within the gastric lumen or pouch as described in U.S. Pat. App. Serial No. 10/188,547, which was filed 7/2/2002 and is incorporated by reference herein in  
30 its entirety, to further restrict the movement of food through the pouch, or the laparoscopic placement of a band, clip, ring or other hollow reinforcement member at the outlet of the gastric lumen such as is done in a VBG, or lap-band procedure to reinforce or narrow the outlet of the lumen.

The gastropasty devices described here, allow for the creation of a smaller gastric lumen to be achieved in a minimally invasive surgical procedure completely from within the stomach cavity. Moreover, the devices described herein are configured such that once acquisition of the tissue is accomplished, any manipulation of the acquired tissue is unnecessary as the devices are able to automatically configure the acquired tissue into a desired configuration whereby the geometry of the devices regulates or prescribes the resulting tissue geometry at the time of acquisition. In operation, the perimeter of the device, and any openings therein, form the template or mold cavity around and into which tissue flows, thereby creating a tissue structure that reflects the geometry of the mold. That is, as the devices are configured such that portions of the stomach wall are automatically positioned for fixation upon being acquired, and the tissue becomes automatically adjusted or tensioned around the perimeter of the distal working portion of the device in the stomach and within the distal working portion inner volume, to achieve the desired resulting geometry (e.g., small gastric pouch or restrictive partition or baffle). Because of the manner in which the tissue is acquired, the tissue intimately surrounds the cartridge member and anvil member to define or calibrate the subsequent volume of the resulting gastric lumen. Thus, the gastric volume may be predetermined by adjusting the volume of the cartridge member and anvil member. As a result, once the desired volume is known and incorporated in the device, the user can achieve a controlled acquisition and without intraprocedural adjustments or positioning requirements. Subsequent manipulation of the tissue may be performed, if desired, to effect certain configurations; however, this manipulation may be omitted entirely.

Turning to the figures, Fig. 1A shows a side view of one variation of gastropasty assembly 10. Assembly 10 may be generally comprised of an elongate tubular member 12 having handle assembly 16 connected at a proximal end 14. An integrated access assembly 18 may also be connected at proximal end 14 for providing access to working lumen 22 defined within elongate member 12. Elongate member 12 may have a circular or elliptical cross-sectional area. Alternatively, the cross-sectional area may take on any number of different cross-sectional configurations, e.g., hexagonal, octagonal, etc., provided that it presents an atraumatic surface to the tissue surfaces within the body. In addition, elongate member 12 may be curved, or may comprise a series of links as described in U.S. Pat. App. Serial No. 10/686,326, which was filed on 10/14/2003, and is incorporated by reference in its entirety herein. In this way, a curved or flexible elongate member, or an elongate member comprising a series of links will help to increase the flexibility of the

elongate member, and hence increase the ease in which the device is handled and operated. Working lumen 22 may extend entirely through tubular member 12 and may be sized to provide access to distal end 20 for various surgical tools or therapies once distal end 20 of assembly 10 is positioned within a hollow body organ, and in particular may be useful to place an endoscope or other visualization tool. Alternatively, a fiberscope or other type of visualization tool may be integrated within the elongate member. Examples of useful scopes may be the Olympus GIF P140, the Fujinon EG 25PE, and the like. Gastroplasty device 24 is typically positioned at the distal end of tubular member 12 and is also generally configured to be advanced atraumatically through the body of a patient and within a hollow body organ, e.g., esophagus, stomach, etc. Alternatively, an optional separate thin walled oversheath, may also be placed over the acquisition device, including the elongate member, to assist in placement, or may be placed over a guidewire or obturator down the esophagus prior to placement of the gastroplasty device and removed with the gastroplasty device once the procedure is complete. The liner may be made of a thin wall polymer such as polyolefin, polytetrafluoroethylene (PTFE), expanded PTFE (ePTFE), silicone and the like, having a wall thickness between 0.004" and 0.025". This liner can serve to guide the gastroplasty device, as well as help to limit trauma to the esophagus and other delicate structures.

Fig. 1B shows a closer detail view of the gastroplasty assembly 10. As shown there, the device comprises a distal working portion, which comprises a cartridge member or pod 26 placed longitudinally in apposition to anvil member or pod 28. As described above, when the device is in use, the tissue of the stomach wall (including, in some instances, the muscular tissue layers) are adjusted or tensioned around the perimeter of the distal working portion, and within the distal working portion inner volume, to achieve a desired resulting geometry (e.g., small gastric pouch or restrictive partition or baffle). Thus, the gastric volume may be predetermined by adjusting the volume of the distal working portion, inner or outer profile. Cartridge member 26 may contain one or several fasteners, e.g., staples, clips, etc., which may be actuated via controls located proximally on handle assembly 16. A septum or barrier 32, described in further detail below, may be removably positioned between cartridge member 26 and anvil member 28 while connection member 30 may connect device 24 to tubular member 12.

Handle assembly 16 may be variously configured depending upon the desired functionality to be implemented on assembly 10. In this variation, handle assembly 16 may generally comprise handle 34 for use by the surgeon or physician in advancing,

withdrawing, or articulating assembly 10. A control for articulating the device 24 between an open and closed configuration may be located on handle 34, shown as clamping control knob 36, while a separate control mechanism, shown here as fastener firing lever 38, may be utilized for deploying the fasteners located within cartridge member 28. Although  
5 specific types of controls are shown, these are intended only to be illustrative of the types of control mechanisms which may be utilized and are not intended to be limiting in scope.

Assembly 10 may further have one or several integrated vacuum ports 40 proximally located on elongate member 12 for fluid connection to one or several vacuum pumps (not shown). One or each of cartridge 26 or anvil 28 members may be fluidly  
10 connected through a common tube 12 or channel or through individually corresponding tubes or channels through elongate member 12 to vacuum ports 40. Additionally, a scope seal housing 42 configured to provide access to the working lumen 22 may also be optionally provided near or at the proximal end of elongate member 12 for the insertion of various tools and devices through elongate member 12 for accessing the distal end of the  
15 assembly 10. An optional auxiliary port 44 may also be provided for allowing fluid communication via a channel or tubing through elongate member 12 between the proximal and distal ends of the assembly 10. Auxiliary port 44 maybe utilized for various purposes, e.g., delivery of fluids or gases into the hollow body organ for transporting drugs or providing insufflation, etc. As noted above, the elongate body may be comprised of a  
20 series of links, similar to those described in U.S. Pat. App. Serial No. 10/686,326, or of an extrusion fabricated with various lumens to accommodate the various control wire and mechanisms of the acquisition device. Similarly, the control mechanisms may be grouped together with a flexible band, and then sheathed in a thin skin sheath, such as heat shrink. The elongate member may also be a combination of an extrusion and a thin wall sheath to  
25 allow for flexibility, and may utilize braided materials, e.g., stainless steel or superelastic materials such as Nickel-Titanium alloy, integrated in the wall of the sheath to prevent kinking and enhance torqueability.

A detailed view of one variation of the gastroplasty devices described herein is shown in the perspective view of Fig. 2A. The cartridge member 26 and anvil member 28,  
30 as described above, may extend longitudinally from the distal end of elongate member 12 via connection member 30. The cartridge member 26 and anvil member 28 may be both or singularly articulatable relative to one another or relative to elongate member 12. A pivot  
50 longitudinally positioned between cartridge member 26 and anvil member 28 may be configured to enable the device to be pivoted into an open configuration for the acquisition

of tissue and a closed or deployment configuration for delivery or advancement of the device into the hollow body organ.

If both members 26,28 are articulatable, they may be configured to be either simultaneously or sequentially articulatable. The cartridge member 26 may contain a  
5 cartridge 52 container fasteners along an outer edge of the member 26 while the anvil member 28 may have an anvil positioned along an outer edge of the member 26 such that the anvil corresponds to the number and position of fasteners within cartridge 52. One or both members 26,28 may also define openings 56,58, respectively, along a portion of the length or the entire length of each of the members 26,28. One or both of these openings  
10 56,58 may be connected via tubing through vacuum lumens 60,62, respectively, defined through elongate member 12 to the vacuum ports 40 located at the proximal end of member 12. Alternatively, a central vacuum lumen may supply both ports, or may bifurcate at the proximal or distal end of member 12. Elongate member 12 may also define various cable lumens 64,66 for the passage of cables for controlling the opening and  
15 closing of members 26,28 as well as additional cable lumen 68 for the passage of cables for actuating deployment of the fasteners from within cartridge 52. Moreover, cable lumen 70 may be used for the passage of cables used for controlling the clamping of the members 26,28 towards one another.

Each of the members 26,28 may have openings 72,74 and 76,78, respectively,  
20 defined at the outer corners of each member opposite pivot 50 to allow for the routing and passage of clamping cables through the device for enabling cartridge member 26 and anvil member 28 to be clamped closed towards one another. Fig. 2B shows a perspective view of the acquisition and fixation device of Fig. 2A with the vacuum tubing and cables routed through the device. As shown, vacuum tubing 80,82 may be routed through elongate  
25 member 12 into a proximal end of one or each of cartridge member 26 and/or anvil member 28 for fluid connection with respective openings 56,58. Cables 84,86 may be utilized for opening and closing the cartridge member 26 and anvil member 28 and cable 88, which may be routed into cartridge member 26, may be positioned and utilized, e.g., for pulling or pushing a wedge mechanism, to deploy fasteners out of cartridge 52.  
30 Moreover, clamping cables 90 may be passed through elongate member 12 and routed through cartridge member 26 and anvil member 28 such that cables 92,94 are passed through openings 72,74 and 76,78 for clamping cartridge member 26 and anvil member 28 closed. Cables 84 and 86 may be replaced by torque shafts connected to handles at the proximal end of the device, to open and close the cartridge and anvil members.

Figs. 3A and 3B show perspective and end views, respectively, of a cross-sectioned portion 100 of a suitable gastroplasty device. As may be seen, septum 32 may be positioned to extend from pivot 50 effectively separating vacuum openings 56,58 within cartridge member 26 and anvil member 28, respectively. Adjacent to opening 56 is fastener cartridge 52 and adjacent to opening 58 is anvil 54 positioned such that when septum 32 is removed or displaced, the articulation of cartridge member 26 and anvil member 28 towards one another about pivot 50 positions cartridge 52 in apposition to anvil 54. Alternatively, anvil member 28 cartridge member 26 may be nonmovable or in a fixed position relative to the longitudinal axis of the device. In this configuration, fastener cartridge 52 and optionally anvil 54, may be actuated to eject from their respective housings to fasten the acquired tissue.

Figs. 4A and 4B show representative illustrations of how gastroplasty device 24 may be advanced transorally through the esophagus ES of a patient and positioned within stomach cavity SC of stomach 110. Making reference now to Fig. 4A, device 24 may be articulated outside the patient via handle 16 so that the proximal portion of elongate member 12 may be positioned such that the spine of the device is placed against a portion of lesser curvature LC and opposite greater curvature GC. In this way, the device 24 extends between the gastroesophageal junction GEJ towards pylorus PY. In addition Fig. 4A depicts the use of a flexible endoscope EN alongside the device 10 to allow direct visualization of the procedure, including the fixation step whereby the scope can then be removed, leaving additional volume remaining in the smaller gastric pouch that may be helpful when removing or detaching the gastroplasty device 24 from the acquired tissue once it has been fixed. If no direct visualization is required, but additional removal volume is desired, an optional expandable balloon, or other expandable member EM may be used alongside the spine of the gastroplasty device, or may be integrated into the spine of the gastroplasty device using known techniques. Fig. 4B shows the positioning of gastroplasty device 10 without the aid of an endoscope, or other direct visualization technique.

Fig. 5A shows an end view of device 24 positioned within stomach cavity SC with pivot 50 placed against stomach wall 120, for instance, against lesser curvature LC in one example of how the device 10 may be used to effect the creation of a gastric lumen or partition within stomach cavity SC. The device is advanced through the esophagus ES while in a deployment configuration, i.e., where the distal working portion of the device DWP is configured so that cartridge member 26 and anvil member 28 are closed such that openings 56,58 and cartridge 52 and anvil 54 are directly positioned in apposition about



septum 32. When desirably positioned, one or both of cartridge member 26 and anvil member 28 may be rotated about pivot 50 in the direction of the arrows shown. Fig. 5B shows cartridge member 26 and anvil member 28 rotated at an angle with a vacuum force activated within openings 56,58. In certain embodiments where no pivoting or movement of the cartridge member 26 or anvil member 28 is necessary, the device is advanced in a static state. As seen, portions of the stomach wall 120 may be acquired and drawn within respective openings 56,58. The configuration of cartridge member 26 and anvil member 28 and the positioning of the device 24 within stomach cavity SC are such that this tissue acquisition procedure also enables the device 24 to be self-adjusting with respect to the acquired tissue 122,124. More particularly, the device 24 is configured such that portions of the stomach wall 120 are automatically positioned for fixation upon being acquired and the device 24 becomes automatically adjusted within stomach cavity SC relative to the stomach wall 120. Furthermore, because of the manner in which the tissue is acquired, the tissue intimately surrounds the cartridge member 26 and anvil member 28, i.e., the distal working portion of the device DWP, by being tensioned or held around the perimeter PT of the distal working portion of the device and within the inner volume IV of the distal working portion of the device to define the subsequent volume or resulting geometry RG resulting gastric lumen as shown by the diagonal and hatched lines respectively in Figs. 5F and 5G. An illustrative depiction of a cross section of a resulting tissue geometry is provided in Fig. 5E. Other depictions of resulting tissue geometries are provided in Figs. 5H and 5I. Shown there are front views of the distal working portion of the device, and cross sectional views (along lines A-A and B-B respectively) of the resulting tissue geometries. In Fig. 5H, the distal working portion has been configured to provide one plication P, whereas in Fig. 5I, the distal working portion has been configured to provide more than one plication. Multiple plications may be useful, for example, to help increase the ease in which the distal working portion of the device is removed from a patient after tissue has been acquired and fixed. Thus, as these Figs. illustrate, the gastric volume may be predetermined by adjusting the volume of the cartridge member 26 and anvil member 28, or geometry of the distal working portion of the device, e.g., the distal working portion of the device may be configured so that the gastric tissue has results in the geometries described, for example, in U.S. Pat. App. Serial No. 10/417,790, which was filed on April 16, 2003 and is hereby incorporated by reference in its entirety.

Optional septum 32 may act effectively as a barrier between openings 56,58 to facilitate the acquisition of the tissue 122,124 into their respective openings 56,58 while

minimizing or eliminating cross acquisition of the tissue into cartridge member 26 and/or anvil member 28. In another alternative, septum 32 may be omitted from the device 24 and acquisition of the tissue may be accomplished by sequentially activating vacuum forces within openings 56 and 58. That is, the cartridge and anvil members may be oriented towards the tissue surface in a sequential fashion, acquiring the tissue adjacent thereto. However, when a septum is employed, it may be removed from between cartridge member 26 and anvil member 28 by translating the septum 32 distally, laterally, or proximally of cartridge member 26 and anvil member 28, after the tissue has been acquired. Alternatively, the septum may be left within stomach cavity SC for later removal, or as will be described in more detail below, may be left within the stomach cavity to biodegrade. Fig. 5C shows septum 32 having been removed so that cartridge member 26 and anvil member 28 may be pivoted from the open configuration back to its closed configuration in the direction of the arrows shown. Because the septum 32 has been removed, tissue region 126 may now be presented for clamping between cartridge 52 and anvil 54.

As shown in Fig. 5D, cartridge member 26 and anvil member 28 may be simply clamped over tissue region 126 and fastened by deploying one or several fasteners from within cartridge 52. In acquiring the tissue 122,124, manipulation of the tissue region 126 or the acquired tissue 122,124 may be eliminated entirely due to the automatic positioning of the tissue for fastening. Once the clamped tissue has been fastened, the device 24 may be withdrawn entirely from the stomach cavity SC, as shown in Fig. 5E. As seen, one or several fasteners 128, e.g., a line of staples, may hold the tissue in its fastened configuration to result in the creation of a partition, creating a restriction, or when desired, creating a gastric lumen or pouch 130, separate from the remainder of the stomach cavity.

Alternative variations of gastroplasty device 24 may also be utilized. For instance, Fig. 6A shows a perspective view of another variation in device 140 partly cross-sectioned for the sake of clarity. In this variation, cartridge member 142 and anvil member 144 may define a curved or arcuate shape. The septum may also be configured to have a longitudinal barrier portion 146 with a first transverse barrier 152 and a second optional transverse barrier 154. One or both barriers 152,154 may extend in a curved or arcuate shape from the longitudinal septum 146 such that an atraumatic surface is presented to tissue during advancement within the patient. The septum may be retained between cartridge member 142 and anvil member 144 via septum detent 148 being slidably positioned within septum retaining channel 150, which extends longitudinally between

cartridge member 142 and anvil member 144. Longitudinal septum 146 may partition openings 156,158, which may function in the same manner as described above for adhering tissue. It may be advantageous to house a pressure transducer 159 near or within the pod(s) or opening(s), to allow the device user to accurately gauge measurement of pressure at the site of tissue adhesion. A drop of pressure within the pod or opening signals to the user that the vacuum seal has been compromised, and therefore the amount of tissue adhered to the system is not optimal. Readings from the transducer can serve as feedback to the user that sufficient vacuum pressure has been maintained, and therefore be a "go-nogo" trigger to the user. Fig. 6B shows a cross-sectional end view of the variation 140 from Fig. 6A. As illustrated, cartridge 162 may retain one or several fasteners 166, shown in this variation as staples, in corresponding apposition to anvil 164 when cartridge member 142 and anvil member 144 are in the closed or delivery configuration. It should be noted that while a rectangular staple jaw is depicted, it may be desirable to provide a curved track or wedge to facilitate the placement of a curved line of staples, from the rectangular jaw. Pivoting member or plate 168, which may function to facilitate the pivoting the device, may be seen as placed over the outer surface of cartridge member 142 and anvil member 144.

Fig 7A shows a perspective view of an open configuration 170 of the device of Figs. 6A and 6B for receiving tissue within openings 156,158. Septum 146 may be removed from the device by translating the septum 146 longitudinally in the direction of the arrow. As shown in the end view in Fig. 7B, pivoting region 160 may be seen expanded via pivoting plate 168, which may be made from various biocompatible materials, e.g., stainless steel, polymers, etc., and which is sufficiently flexible to enable the device to transition between the open and closed configurations. Fig 8A shows the open configuration 180 in which the septum 146 has been removed from the device. As described above, the septum may be removed once the tissue has been acquired within their respective openings. Fig. 8B shows an end view of the device with the septum removed. The tissue acquired within open region 182 may be clamped by articulating cartridge member 142 and anvil member 144 in the direction of the arrows to result in the configuration shown in Fig. 9A, which shows the device 190 ready for fastening the clamped tissue within clamping region 192. Fig. 9B shows an end view of the device configured into its closed configuration for fastening the tissue within clamping region 192. As described above, because the stomach tissue may be automatically configured for

fastening once the tissue has been acquired, manipulation of the tissue is rendered unnecessary during clamping and fastening of the tissue.

In facilitating the clamping of cartridge member 142 and anvil member 144 onto the tissue, clamping cables may be utilized, as described above. Figs. 10A to 10C show end views of cartridge member 142 and anvil member 144 during delivery, during tissue acquisition, and prior to clamping of the tissue, respectively, and one example of how clamping cable 200 may be routed with respect to septum 146. Fig. 10A shows septum 146 in position between cartridge member 142 and anvil member 144 with clamping cable 200 routed within a cable constraining slot 202 defined in an adjacent portion of septum 146. The clamping cable 200 may extend between cartridge member 142 and anvil member 144 through clamping cable openings 204 defined in both cartridge member 142 and anvil member 144. Once the septum 146 is removed, as shown in Fig. 10C, the clamping cable 200 may be released from slot 202 and tensioned to bring cartridge member 142 and anvil member 144 towards one another, as described in further detail below. Other mechanisms of clamping are also suitable, for example, the tissue may be clamped using hydraulic, pneumatic, or electropneumatic mechanisms, all of which are well known in the art.

Figs. 11A and 11B shows perspective and end view of another alternative gastroplasty device 210. This variation shows cartridge member 212 and anvil member 214 in a closed configuration with extension member 218 connected to longitudinal pivot 216. The septum, in this variation, may comprise a longitudinal septum member 220 and a perpendicularly positioned transverse septum member 222, which may extend partially over the openings 228, 230 when cartridge member 212 and anvil member 214 are in an open configuration, as shown in Fig. 11C. Respective vacuum tubing 224, 226 may be fluidly connected to one or both openings 228, 230 defined within their respective members 212, 214. Fig. 11D illustrates the device with the septum translated distally showing a clearer view of opening 230.

Figs. 12A to 12C show perspective views of yet another variation of gastroplasty device 240. In this variation, cartridge member 242 and anvil member 244 may be pivotally connected via longitudinally defined pivot 246. Similar to the variation of Figs. 11A and 11B, the septum may also comprise a longitudinal septum member 248 positionable between members 242, 244 and an optional perpendicularly configured transverse septum member 250. Also seen are vacuum tubing 252, 254 fluidly coupled to their respective openings 260, 262. As discussed above, because the resulting gastric lumen

may be defined by the shape and volume of the device, cartridge member 242 and anvil member 244 may each define tapered distal ends 256,258, respectively, to provide an atraumatic surface for advancement within the patient and to facilitate formation of a gastric lumen having a tapered distal region. The proximal shoulder of the members may also be tapered to facilitate removal of the device once the procedure has been completed. Moreover, this variation also shows openings 260,262 which may be elongated to extend over a majority of the length of their respective members 244,242.

Yet another variation of an alternative acquisition pod assembly 270 is shown in the cross-sectioned perspective view of Fig. 13A. This variation may generally comprise pod walls 272,274 each defining an undercut section 276,278 having projections or serrations 280,282 along their edges directed or angled towards one another. The assembly 270 may be comprised of a biocompatible material, e.g., polymers, polycarbonates, etc., which has an elastic bending modulus sufficiently low to allow for plastic deformation of the pod assembly 270 to occur. A barrier 286 having a plurality of openings 288 defined over its surface may be positioned between pod walls 272,274 such that tissue acquisition chamber 284 is defined as shown. A vacuum chamber 290 may be located beneath barrier 286 with vacuum plenum 292 defined by chamber 290 and barrier 286.

In operation, as shown in Fig. 13B, tissue 294 may be acquired against or within acquisition chamber 284 by the application of a relatively low pressure vacuum force applied through plenum 292, which may create a low vacuum within chamber 284 through openings 288. Once the tissue 294 has been first acquired, a higher pressure vacuum force may be applied through plenum 292 such that pod walls 272,274 and undercut sections 276,278, respectively, are plastically deformed and drawn towards one another in the direction of the arrows, as shown in Fig. 13C. As the undercut sections 276,278 are drawn inwards and shown in Fig. 13D, the acquired tissue 294 may become pinched at retained tissue region 296 resulting in a temporary mechanical fixation of the tissue. A cessation of the high vacuum force may then result in a relaxation of the pod walls 272,274 and ultimately of the release of the acquired tissue 294 when the vacuum force is ceased altogether. Spearing mechanisms or a plurality of sharp hooks may also be used, in conjunction with, or in lieu of, the undercut sections described above.

Yet another variation of a gastropasty device 300 is shown in the perspective views of Figs. 14A to 14D. This particular variation may utilize a parallel translational motion in moving the cartridge member 306 and anvil member 308 between the open and closed configuration rather than a pivoting motion, as described above in other variations.

As shown in Fig. 14A, device 300 may comprise pod assembly 302 connected at the distal end of elongate tubular member 304. Septum 310 may be removably positioned between cartridge member 306 and anvil member 308. A groove plate 312 defining a longitudinally extending slot may be positioned adjacent to cartridge member 306 and anvil member 308 on a side opposite to that of septum 310.

Fig. 14B shows cartridge member 306 and anvil member 308 articulated away from one another into an open configuration while maintaining a parallel orientation relative to one another. In this open configuration, tissue may be acquired and drawn into respective pod members 302 on opposite sides of septum 310. Groove plate 312, which may be comprised of various biocompatible materials, e.g., stainless steel, polycarbonate, various polymers, etc., may be held stationary relative to pod assembly 302 and may further help maintain cartridge member 306 and anvil member 308 in their parallel orientation during reconfiguration. Fig. 14C shows septum 310 removed from between cartridge member 306 and anvil member 308 by being translated distally via septum control member 314, which may be articulated from a proximal end of elongate member 304. Once the septum 310 has been removed, cartridge member 306 and anvil member 308 may be articulated to clamp onto the tissue while maintaining their parallel configuration, as shown in Fig. 14D. Once the tissue has been clamped, cartridge member 306 may be actuated to fasten the tissue. Fig. 14E shows a cross-sectional perspective view of a portion of pod members 302 in an open configuration with septum 310 still in place between cartridge member 306 and anvil member 308. As shown, cartridge member 306 and anvil member 308 along with acquisition chambers 316,318, respectively, may be seen maintaining a parallel configuration relative to one another.

Fig. 15 shows a perspective view of yet another variation of a gastropasty device 320 positioned upon the distal end of elongate tubular member 336. Similar to the device of Fig. 14A, cartridge member 322 and anvil member 324 may be configured to open and close while maintaining a parallel configuration relative to one another. Optional septum 326 may also be positionable between members 322,324. However, device 320 may comprise a translationally movable trolley plate 328 which may be advanced or retracted longitudinally. At least two wedging members 330,332 may protrude from plate 328 at an angle which correspondingly abuts with the distal ends of members 322,324 such that when plate 328 is longitudinally translated, wedging members 330,332 may drive cartridge member 322 and anvil member 324 towards one another in a parallel configuration to clamp onto any tissue which may have been acquired by device 320. A septum groove

334 may be defined longitudinally along the plate 328 so as to enable unhindered movement relative to the septum 326. Cartridge member 322 and anvil member 324 may also be configured such that when trolley plate 328 compresses the members 322,324 onto tissue, fasteners are automatically deployed into the tissue to fasten it.

5 Figs. 16A to 16C show side, end, and bottom views, respectively, of another variation of gastropasty device 340. Generally, while other variations have enabled movement of respective pod members, this variation may maintain a static acquisition pod. Vacuum pod 342 may be comprised of a variety of biocompatible materials, e.g., polycarbonate, etc., shaped into opposing walls having vacuum plenums 348,350 defined  
10 along the lengths of the opposing walls. While two vacuum plenums are depicted, it should be understood that any number of vacuum plenums may be employed as well. For example, a single vacuum plenum may be used. Similarly, three or more vacuum plenums may be used. A septum having a longitudinal member 346 and an optional perpendicularly positioned transverse member 344 may be positioned to fit within vacuum  
15 pod 342 such that at least two tissue acquisition chambers 352,354 are formed along the length of pod 342. Alternatively, the septum may only include longitudinal member 346, and may omit any transverse members entirely, which may aid in reducing the overall profile of the distal working end of the device. The septum may generally be comprised of a similar material as vacuum pod 342 and may be further coated with a layer of a  
20 lubricious material, such as Teflon®. Furthermore, the septum may be formed of a bioabsorbable material that may either dissolve upon exposure to gastric fluids after tissue has been acquired, or may be releaseably attached to pods or chambers and fixed in place between tissue folds (e.g. left behind) once device is removed. The septum may also have end member 356 at one end of the septum which may act as a stop for the device 340. Fig.  
25 16D shows a perspective view of acquisition device 340 revealing the vacuum plenum defined along the bottom of pod 342. While rectangular devices are depicted in Figs. 16A-16D, it should be understood that the device 343 can have a curved or arcuate shape as well, as shown in Fig. 16E. Also depicted there are optional septum 345 and a single vacuum plenums 347.

30 To facilitate the acquisition of the tissue, various features may be incorporated into any of the variations described herein. For instance, one optional feature may be seen in Fig. 17, which shows a perspective view of gastropasty device 360 having a plurality of projections or serrations 366,368 defined along the mating surfaces of cartridge member 362 and/or anvil member 364. Serrations 366,368 may be positioned adjacent to the

cartridge and/or anvil to provide additional mechanical support of the tissue positioned between clamped members of the acquisition device 360 during tissue fixation. Alternatively clearance cuts (not shown) on the cartridge may be included to reduce the surface area and required clamping force for fixation, as well as adding traction to the system. As described above, spearing mechanisms, or sharp projections may be used as well.

Another optional feature which may be integrated with the devices herein is shown in the perspective view of gastroplasty device 370 of Fig. 18A. A single pod member 372 is shown for illustrative purposes as the feature of a rotatable shaft may be integrated into any of the devices described herein. Pod member 372 may define an opening 374 along its length for receiving tissue therein, as described above; however, the device may also comprise at least one rotatable shaft 376 positioned longitudinally within the pod member 372 adjacent to the opening 374. The rotatable shaft 376 may define one or several projections or serrations 378 along its surface such that tissue drawn into the opening 376 via a vacuum force may also be mechanically acquired by rotation of the shaft 376 in a first direction to allow serrations 378 to become affixed to the tissue. The shaft 376 may be rotated in a second opposite direction to release the acquired tissue. Moreover, the pod member 372 may acquire the tissue with the vacuum force alone, as described above, with the rotatable shaft 376 alone, or with a combination of both the vacuum force and shaft 376 operated in conjunction with one another. Fig. 18B shows a cross-section of pod member 372 having a second rotatable shaft 380 also defining projections or serrations 382 along its surface. In the case of two shafts utilized together, they may be configured to be counter-rotating such that the acquired tissue 384 is optimally retained within opening 374. Likewise, to release the acquired tissue 384, the shafts 376,380 may be counter-rotated in the opposite direction.

Yet another feature which may be integrated with the devices herein is shown in the perspective view of Fig. 19A, which illustrates acquisition and fixation device 390 having a single pod member for the sake of clarity. Also shown are septum 400 and opening 402. A segmented staple cartridge 392 having an adjustable curvature and height may be integrated into any number of the devices described above. Cartridge 392 may be comprised of one or more staple cartridge segments 394 which are pivotally connected to one another via joints 396 which may allow not only pivotal side-to-side motion between segments 394 but also height adjustments relative to one another.



Each staple cartridge segment 394, as seen in the detail perspective view of Fig. 19B, may each define staple openings 398. In connecting with adjacent cartridge segments 394, a radiused pivot member 404 may extend from one side of the segment 394 and a receiving cavity 406 may be defined in the opposite side of the segment 394. Each pivot member 404 may extend away from segment 394 such that when positioned into a corresponding receiving cavity 406, adequate spacing exists between segments 394 such that side-to-side motion is possible between the segments 394 to define a curvature of the resulting cartridge 392. Moreover, because of the translational fit between pivot member 404 and cavity 406, the heights of different segments 394 may be varied to define a curve in the height of cartridge 392, as shown by height differential Z in Fig. 19A and the height differences between adjacent segments 394 in Fig. 19B. Accordingly, cartridge 392 may be varied in length by varying the number of segments utilized, as well as varied in curvature and in height. The corresponding anvil member may be adjusted to accordingly match the curvature of the cartridge 392.

In addition to variations on types of pod members and tissue acquisition enhancements, the septum may also be adjusted in various ways to accommodate different devices and desired results. For instance, gastropasty device 410 may be seen in the perspective view of Fig. 20A with one variation of septum assembly 412 positioned between pod members 422, 424. Septum assembly 412 may be seen in better detail in the perspective view of Fig. 20B. In this variation, the septum may have a transverse septum member 414 perpendicularly positioned relative to longitudinal septum member 416 extending from extension member 420, as described above. However, this variation may define a tapered edge 418 along the proximal edge of longitudinal septum member 416. This tapered edge 418 may extend at an acute angle from extension member 420 towards transverse septum member 414 to facilitate removal of the septum assembly 412 from within the hollow body organ.

Another alternative on septum variations is shown in the perspective views of Figs. 21A and 21B. Ribbed septum assembly 430 may generally comprise transverse septum member 432, longitudinal septum member 434, tapered edge 440 extending between extension member 438 and transverse septum member 432. However, the septum members 432, 434 may be ribbed 436 to facilitate collapse of the septum assembly 430 when withdrawn from the hollow body organ. The hardness and geometry of the septum assembly 430 may be accordingly configured to provide adequate strength during vacuum-assisted tissue acquisition yet flexible enough to collapse when removed from the patient.

Fig. 21C shows one example of how collapse of the septum may be facilitated by withdrawing the septum into a receiving member 442 having a tapered opening 444. As the septum assembly 430 is pulled into channel 446, the ribbed surfaces may collapse into a smaller configuration for withdrawal.

5           Another alternative septum variation 450 is shown in the perspective view of Fig. 22A. Longitudinal septum member 452 may have at least two transverse septum members 454,458 extending to opposite sides of longitudinal septum 452. Each of the transverse septum members 454,458 may define a helical tapered edge 456,460, respectively, such that removal of the septum assembly 450 from the hollow body organ is facilitated. Fig. 10 22B shows an end view of the septum assembly 450 positioned between pod members 462,464.

Rather than using a perpendicularly-configured septum, an alternative may be to utilize a septum member having only a longitudinally extending member which extends sufficiently high so as to prevent cross-acquisition of tissue into the pod members. Fig. 15 23A illustrates an end view of an extendable septum assembly 470 positioned between pod members 472,474 placed against stomach tissue 476. Fig. 23B shows a side view of one variation for extending the septum assembly 478 from a low profile delivery configuration to an extended deployed configuration. Once septum assembly 478 has been advanced into a hollow body organ in its low profile configuration, the assembly 478 may be 20 deployed into its expanded configuration. An extension septum member 480 may have a number of projections 482,484 protruding from either side of extension 480. A corresponding longitudinal septum base 486 may define channels 488,490 through which projections 482,484 located on extension 480, respectively, maybe translated within. Moreover, channels 488,490 may be angled relative to a longitudinal axis defined by 25 septum base 486 such that distally advancing extension 480 relative to septum base 486 raises extension 480 a distance away from base 486, effectively increasing a height of the septum assembly 478. Projections 482,484 and channels 488,490 may be covered so that travel of the extension 480 is uninhibited by surrounding tissue.

Similarly, Fig. 23C shows a side view of another septum assembly variation 492 in 30 which extension septum member 494 is extendable from base septum member 496. When advanced distally relative to longitudinal septum base 496, extension 494 may traverse channels 498, which form ramped channel portion 500, defined within base 496 to extend into a septum assembly 492 having an increased height.

Fig. 24A shows another alternative septum assembly 510 which may be configured to deploy an extendable septum from a rolled-up configuration. As seen in the end view, septum assembly 510 is in a deployed configuration between pod members 512,514. Retractable septum 520, may be extended from a rolled-up configuration within drum 516, which may be positioned between opposing transverse septum members 518. Cables 522 may extend from transverse septum members 518 for attachment to pod members 512,514. After the tissue has been acquired, retractable septum 520 may be retracted into drum 516 via manipulation of control cable 524, as seen in Fig. 24B, to assume a low profile for withdrawal from the patient.

Another variation of septum assembly 530 is further shown in the perspective views of Figs. 25A and 25B. Septum assembly 530 may comprise transverse septum member 532 and collapsible septum member 534, which may be configured between a collapsed configuration and an extended configuration. Transverse septum 532 may be elevated and lowered relative to pod members 548,550 during delivery and deployment of septum assembly 530, e.g., via crossmembers 536,538 which may be configured into a scissors-type mechanism. Cross-members 536,538 may have its proximal ends connected to control cable 542, which may be routed through extension member 544, while an intermediate portion of both cross-members 536,538 may be pivotally connected to one another via pivot 540. Thus, articulation of control cable 542 from its proximal end by the surgeon or physician may actuate the scissors mechanism to either raise or lower transverse septum 532 in the directions of the arrow as shown. Transverse septum 532, when positioned between pod members 548,550, may be secured via cables 546, as shown in Fig. 25B.

Figs. 25C and 25D show end views of transverse septum 532 and the collapsible septum member in an expanded or extended configuration 552 and in a collapsed configuration 554. The collapsible septum member may be enclosed by a biocompatible material to prevent pinching of tissue by the cross-members 536,538. Moreover, the material covering the collapsible septum may also be distensible, if desired. Various materials may be utilized, e.g., nylon, polymeric materials, woven materials made from various polymers, latex, elastomers, etc.

Figs. 26A to 26C show end, bottom, and perspective views of yet another alternative septum 560. This particular septum 560 may be utilized with the device 340 of Figs. 16A to 16D. As shown, longitudinal septum 562 may be perpendicularly and integrally connected with transverse septum member 564 at one end and base septum

member 566 at an opposing end of longitudinal septum 562. Transverse septum member 564 may define radiused corners 568 at each of its four corners such that an atraumatic surface is presented to the tissue during use within a patient. Moreover, septum 560 may be extruded or formed from a singular piece of biocompatible material (any of the biocompatible materials suitable for such a structure as discussed herein may be utilized) such that a uniform structure is created.

Figs. 27A and 27B show perspective views of an alternative septum assembly 570 which may also be utilized particularly with the device 340 as discussed above. Fig. 27A shows septum 570 in a low profile delivery configuration where septum 570 may generally be comprised of two elongate T-shaped members. Each of the T-shaped members may be further comprised of longitudinal septum members 572,572' and transverse septum members 574,574', respectively. Each of the two elongate T-shaped members need not be uniform with one another depending upon the device into which the septum assembly 570 is placed, but each member may be pivotally connected to one another via pivot 576 at a corner of adjacent longitudinal members 572,572'. Thus, during delivery of the device and septum 570 into the patient body, the low profile configuration of Fig. 27A may be maintained and prior to or during tissue acquisition and fixation, one of the members, e.g., septum members 572',574' may be pivoted in the direction of the arrow such that the longitudinal portions of the septum 572,572' contact one another to form an acquisition configuration 578 for the septum assembly, as shown in Fig. 27B. After tissue acquisition and fixation, the septum may be reconfigured into its low profile configuration for removal from the patient.

The septum in any of the above embodiments may be formed of a bioabsorbable and/or biocompatible material such as polyester (e.g., DACRON® from E. I. Du Pont de Nemours and Company, Wilmington, DE), polypropylene, polytetrafluoroethylene (PTFE), expanded PTFE (ePTFE), polyether ether ketone (PEEK), nylon, extruded collagen, silicone, polylactic acid (PLA), poly(lactic-co-glycolic acid) (PLGA), or polyglycolic acid (PGA). Furthermore, it may be flexible, biocompatible material which can either be left behind within the partition or expelled distally, and either absorbed within the stomach, or digested and expelled through the patient's gastrointestinal tract.

As discussed above, once the gastroplasty device has acquired the appropriate tissue, the device may be clamped upon the tissue to be fastened. Clamping multiple layers of tissue to one another may require a clamping mechanism which is configured to deliver a high degree of clamping pressure. One example of such a clamping mechanism

580 is shown in the perspective views of Figs. 28A to 28C, which show one variation for opening the clamp. Clamping mechanism 580 may have attachment members 582,584 for secure connection to each of a pod member. Each of the attachment members 582,584 may be connected to one another via rotatable cams 586,588, where each cam may have a rotatable pivot, 590,592, respectively, protruding therefrom. Fig. 28A shows clamping mechanism 580 in a closed and clamped configuration while Fig. 28B shows the mechanism 580 being initially opened. To open (or close) the mechanism 580, cam 586 may be rotated by actuating a control cable 600, which may be routed, for instance, through a tubular member 596 positioned within the elongate member 12, from its proximal end. Cam 588 may then be rotated by actuating control cable 602, which may be routed within tubular member 598 also through tubular member 596. Because attachment members 582,584 rotate about pivot 590, a channel 594 may be defined in member 582 within which pivot 592 may translate when cam 588 is rotated to effectuate clamping or opening of the pod members.

In addition to a cam mechanism 580, clamping cables may also be utilized, as discussed above. Fig. 29A shows a perspective view of one example of how clamping cables may be routed through an acquisition and fixation device 610. As seen, device 610 having pod members 612,614 may be pivotable about longitudinal pivot 616. Although a pivoting device is shown in this variation, the routing of cables may be utilized in any of the other acquisition and fixation devices utilizing pivoting motion as well as parallel clamping. A first clamping cable 620 may be routed into one of the pod members, e.g., pod member 614, through positioning member 630 mounted on pod member 614 and routed over pulley or radiused member 622, also contained within pod member 614. First cable 620 may be looped 632 adjacent to pivot 616 to allow for placement of the septum (not shown for clarity) and then anchored to clamping cable anchor 618. Likewise, second clamping cable 626 may be routed through positioning member 630 adjacent to first clamping cable 620 and through pod member 614 and over pulley or radiused member 628, also contained within pod member 614. Second cable 626 may also be looped 632 adjacent to pivot 616 to allow for placement of the septum and then anchored to clamping cable anchor 624.

Fig. 29B shows a cross-sectioned end view of a parallel clamping device with the septum 634 shown. Like features are similarly numbered as corresponding features from Fig. 29A. As in the pivoting variation, first 620 and second 626 clamping cables may be routed through corresponding tubular members 640 and the cables may be looped through

one or more slots 642 defined in septum 634 and subsequently routed into the opposing pod member for anchoring. Clamping cables 620,626 are preferably routed to facilitate the unhindered translation of septum 634 as well as to ensure unobstructed access to openings 636,638 for the tissue to be acquired and fastened.

5           In yet another clamping variation, Figs. 30A and 30B show side and edge views of an alternative gastropasty device 650 utilizing linked pod members. Cartridge member 652 and anvil member 654 may be connected to one another via linking arms 656,658 pivotally attached to one another via pivot 660 at one end of the device 650 and via linking arms 662,664 also pivotally attached to one another via pivot 666 at the opposite end of the  
10 device 650. Clamping cables 672 may be routed through tubular member 670 into the device 650 and over pulleys 674,676, as described above, for moving anvil member 654 between an open and closed configuration when acquiring tissue within acquisition region 668. Firing cable 678 may be manipulated to deploy the fasteners from within cartridge member 652 when anvil member 654 is clamped over the acquired tissue. Deployment of  
15 the fasteners from cartridge member 652 may be achieved by incorporation of the firing wedge and other mechanisms as taught in U.S. Patent No. 4,610,383, which is hereby incorporated by reference in its entirety. In addition, clamping may be accomplished via hydraulic, pneumatic, or electropneumatic mechanisms, as discussed above.

20           In describing the system and its components, certain terms have been used for understanding, brevity, and clarity. They are primarily used for descriptive purposes and are intended to be used broadly and construed in the same manner. Having now described the invention and its method of use, it should be appreciated that reasonable mechanical and operational equivalents would be apparent to those skilled in this art. Those variations are considered to be within the equivalence of the claims appended to the specification.

WE CLAIM:

1. A gastroplasty device, comprising:  
a first acquisition member and a second acquisition member in apposition to one another along a first longitudinal axis, wherein at least one of the acquisition members is adapted to adhere tissue thereto such that the tissue is positioned between the first and second acquisition members.
2. The gastroplasty device of claim 1, wherein at least one of the acquisition members is movable relative to the first longitudinal axis between a delivery configuration and a deployment configuration.
3. The gastroplasty device of claim 1, further comprising an elongate body attachable to the acquisition apparatus.
4. The gastroplasty device of claim 1, wherein a longitudinal axis defined by the elongate body is parallel with a longitudinal axis defined by the apparatus.
5. The gastroplasty device of claim 1, wherein each of the first and second acquisition members is adapted to adhere tissue thereto.
6. The gastroplasty device of claim 1, further comprising a septum removably positioned between the first and second acquisition members.
7. The gastroplasty device of claim 6, wherein each of the first and second acquisition members is movable relative to the septum between the delivery configuration and deployment configuration.
8. The gastroplasty device of claim 6, wherein each of the first and second acquisition members is pivotally movable relative to the septum.
9. The gastroplasty device of claim 6, wherein each of the first and second acquisition members is movable in a radial direction from one another relative to the septum.
10. The gastroplasty device of claim 6, wherein the first and second acquisition members are movable simultaneously.
11. The gastroplasty device of claim 6, wherein the first and second acquisition members are movable sequentially.
12. The gastroplasty device of claim 6, wherein the first and second acquisition members are movable independently of one another.
13. The gastroplasty device of claim 6, wherein the septum comprises a first barrier extending longitudinally between the first and second acquisition members.

14. The gastropasty device of claim 13, wherein the septum comprises a second barrier transverse to the first barrier such that the second barrier is in apposition to the first and second acquisition members.

15. The gastropasty device of claim 14, wherein the second barrier is planar.

5 16. The gastropasty device of claim 14, wherein the second barrier is curved about each of the first and second acquisition members.

17. The gastropasty device of claim 14, wherein the second barrier extends in apposition along a portion of the first acquisition member and in apposition along a portion of the second acquisition member.

10 18. The gastropasty device of claim 14, wherein the second barrier is adjustable in height relative to the first barrier.

19. The gastropasty device of claim 14, wherein the second barrier is adjustably extendable from the first barrier.

15 20. The gastropasty device of claim 14, wherein the first and second barriers are collapsible between a delivery configuration and a deployed configuration.

21. The gastropasty device of claim 6, wherein at least one acquisition member is pivotally movable relative to the septum.

22. The gastropasty device of claim 6, wherein at least one acquisition member is movable in a radial direction relative to the septum.

20 23. The gastropasty device of claim 6, wherein a proximal portion of the septum is tapered.

24. The gastropasty device of claim 6, wherein the septum comprises a ribbed surface such that the septum is configurable from an expanded configuration to a collapsed configuration.

25 25. The gastropasty device of claim 6, wherein the septum comprises a bioabsorbable material.

26. The gastropasty device of claim 25, wherein the bioabsorbable material is selected from a group consisting of polylactic acid (PLA), poly(lactic-co-glycolic acid) (PLGA), and polyglycolic acid (PGA).

30 27. The gastropasty device of claim 6, wherein the septum is configured to be left at the deployment site.

28. The gastropasty device of claim 1, wherein at least one of the acquisition members has a curved outer surface.



29. The gastroplasty device of claim 1, wherein at least one of the acquisition members defines an atraumatic tip at a distal end thereof.

30. The gastroplasty device of claim 1, wherein the first acquisition member comprises a cartridge assembly containing at least one fastener therein for affixing to the  
5 tissue.

31. The gastroplasty device of claim 30, wherein the cartridge assembly is straight along the first acquisition member.

32. The gastroplasty device of claim 30, wherein the cartridge assembly is curved along the first acquisition member.

10 33. The gastroplasty device of claim 30, wherein the second acquisition member comprises an anvil assembly.

34. The gastroplasty device of claim 1, further comprising a vacuum pump in fluid communication with at least one of the acquisition members.

15 35. The gastroplasty device of claim 1, wherein the first and second acquisition members each define at least one opening therein which is in fluid communication with a proximal end of the apparatus.

36. The gastroplasty device of claim 35, wherein the first and second acquisition members are adapted to pivot towards one another depending upon a vacuum force applied through the at least one opening.

20 37. The gastroplasty device of claim 1, wherein at least one of the acquisition members comprises serrations along the acquisition member.

38. The gastroplasty device of claim 1, wherein at least one of the acquisition members comprises elongate fastening members adapted to be passed through the adhered tissue.

25 39. The gastroplasty device of claim 1, further comprising at least one rotatable member contained within at least one acquisition member, wherein the rotatable member has an outer surface defining serrations thereon for grasping the tissue within the acquisition member when rotated about a longitudinal axis.

30 40. The gastroplasty device of claim 1, further comprising a pull-cable attached to the first and second acquisition members for actuating the apparatus between a delivery configuration and a deployment configuration.

41. The gastroplasty device of claim 1, further comprising a torque-rod coupled to the first and second acquisition members for actuating the apparatus between a delivery configuration and a deployment configuration.

42. The gastroplasty device of claim 1, wherein the first and second acquisition members are hydraulically actuated between a delivery configuration and a deployment configuration.

43. The gastroplasty device of claim 1, wherein the first and second acquisition  
5 members are pneumatically actuated between a delivery configuration and a deployment configuration.

44. The gastroplasty device of claim 1, wherein the first and second acquisition members are comprised of a plurality of articulatable links.

45. A gastroplasty device for forming a gastric pouch, comprising:  
10 a distal working portion having a longitudinal axis, a perimeter and an inner volume, and further having a tissue acquisition member along the longitudinal axis adapted to adhere tissue thereto such that the tissue is positioned within the inner volume and about the perimeter of the distal working portion to define a gastric pouch.

46. The gastroplasty device of claim 45, wherein the distal working portion has  
15 a rectangular configuration.

47. The gastroplasty device of claim 45, wherein the distal working portion has an arcuate configuration.

48. The gastroplasty device of claim 45, further comprising an elongate body attachable to the distal working portion.

20 49. The gastroplasty device of claim 45, further comprising a septum.

50. The gastroplasty device of claim 45, wherein the tissue acquisition member is movable relative to the longitudinal axis between a delivery configuration and a deployment configuration.

51. The gastroplasty device of claim 45, further comprising an expandable  
25 element.

52. The gastroplasty device of claim 51, wherein the expandable element is selected from the group consisting of a scope, a balloon, and a wire form.

53. The gastroplasty device of claim 45, adapted for use with an endoscope.

54. The gastroplasty device of claim 45, further comprising a transducer.

30 55. The gastroplasty device of claim 49, wherein the tissue acquisition member is pivotally movable relative to the septum.

56. The gastroplasty device of claim 49, wherein the septum comprises a bioabsorbable material.

57. The gastroplasty device of claim 56, wherein the bioabsorbable material is selected from the group consisting of polylactic acid (PLA), poly(lactic-co-glycolic acid) (PLGA), and polyglycolic acid (PGA).

58. The gastroplasty device of claim 45, wherein the tissue acquisition member  
5 comprises a cartridge assembly containing at least one fastener therein for affixing to tissue.

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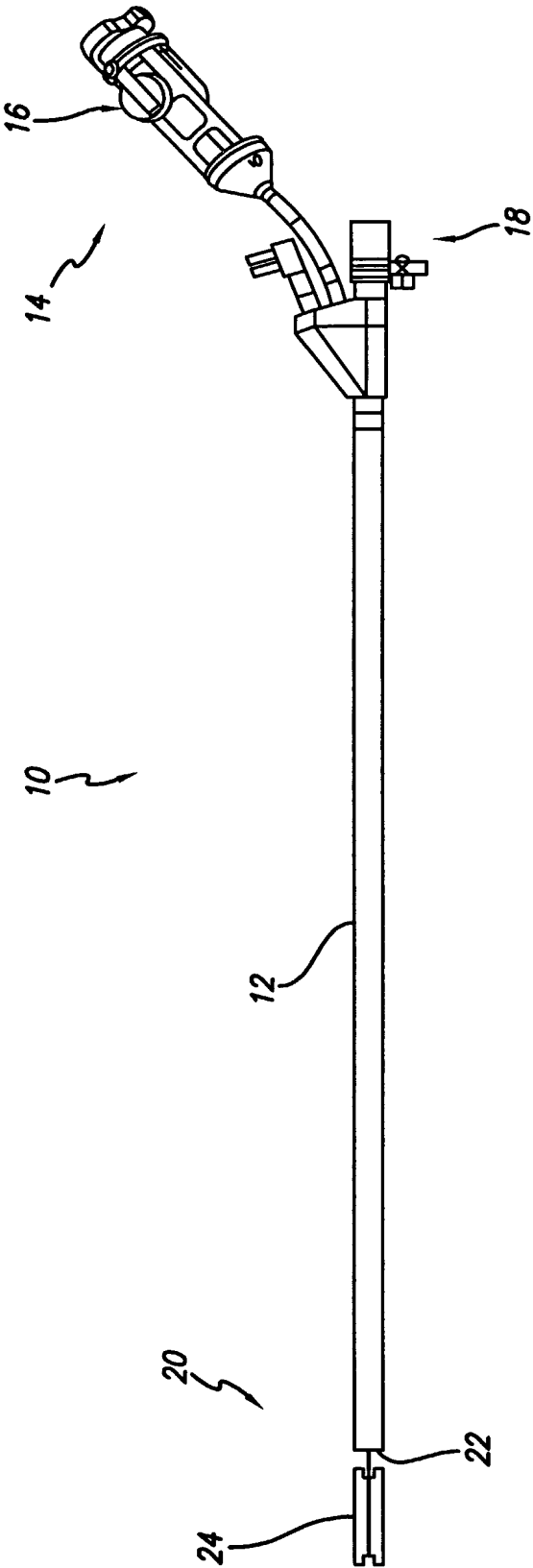


FIG. 1A

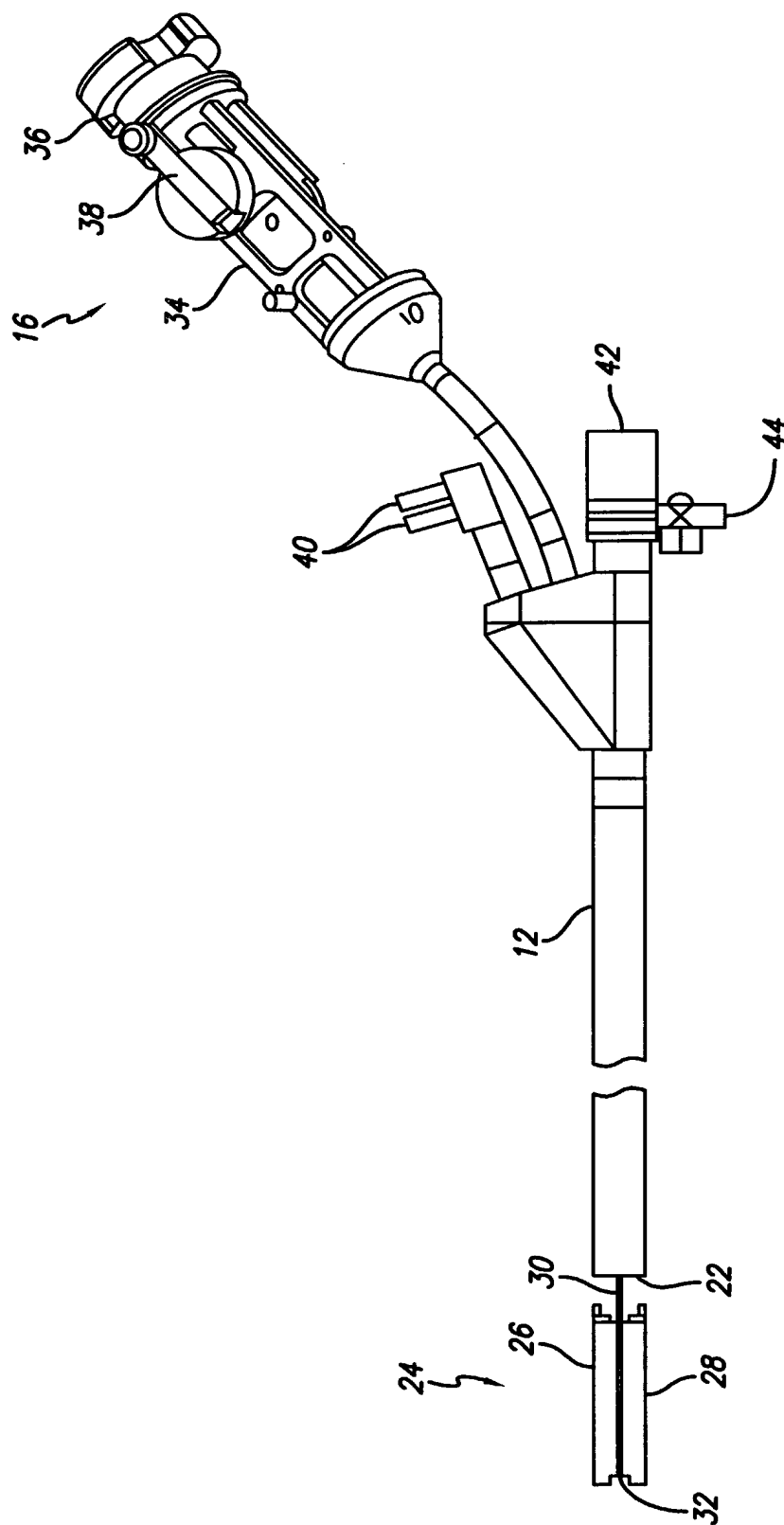
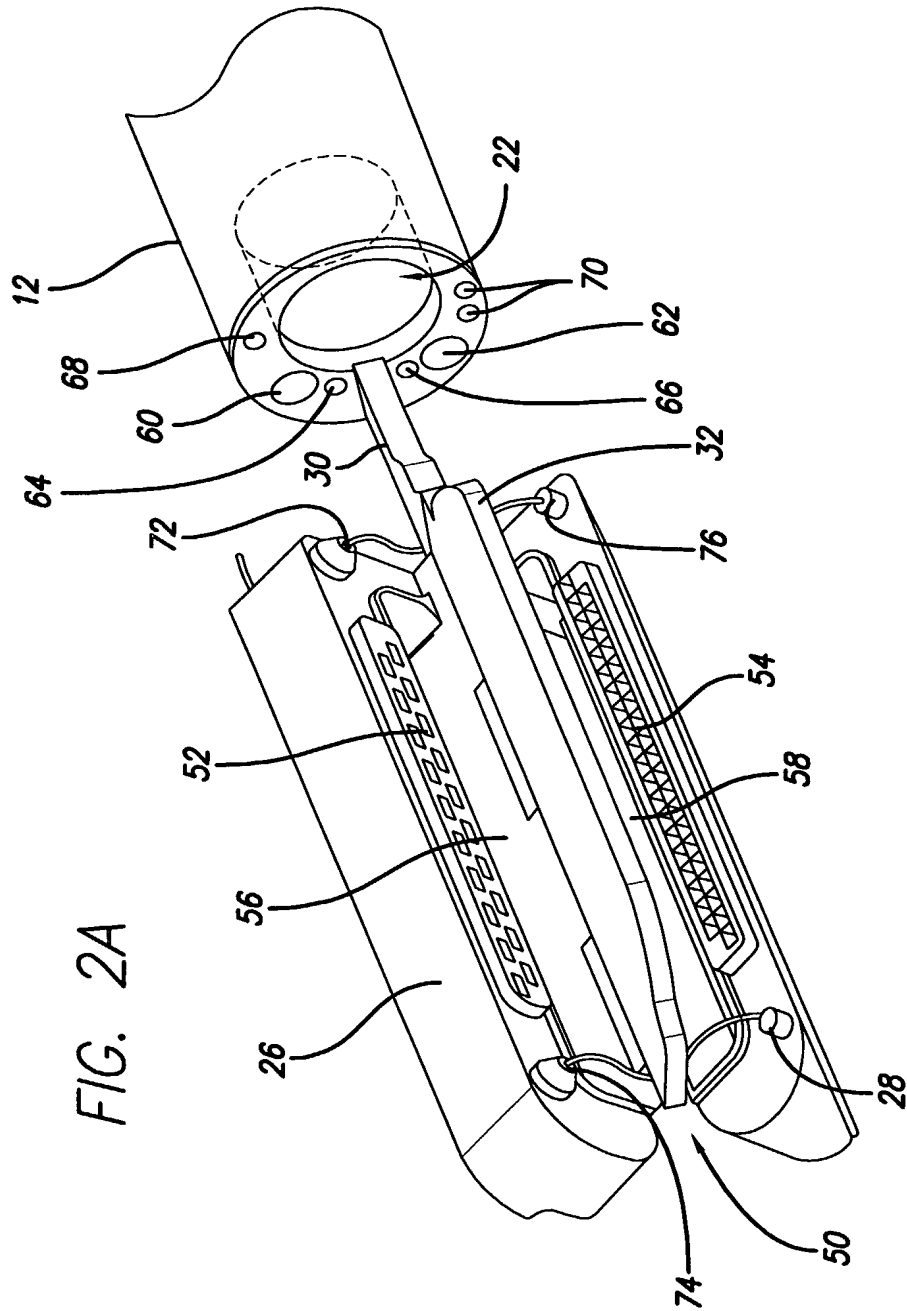
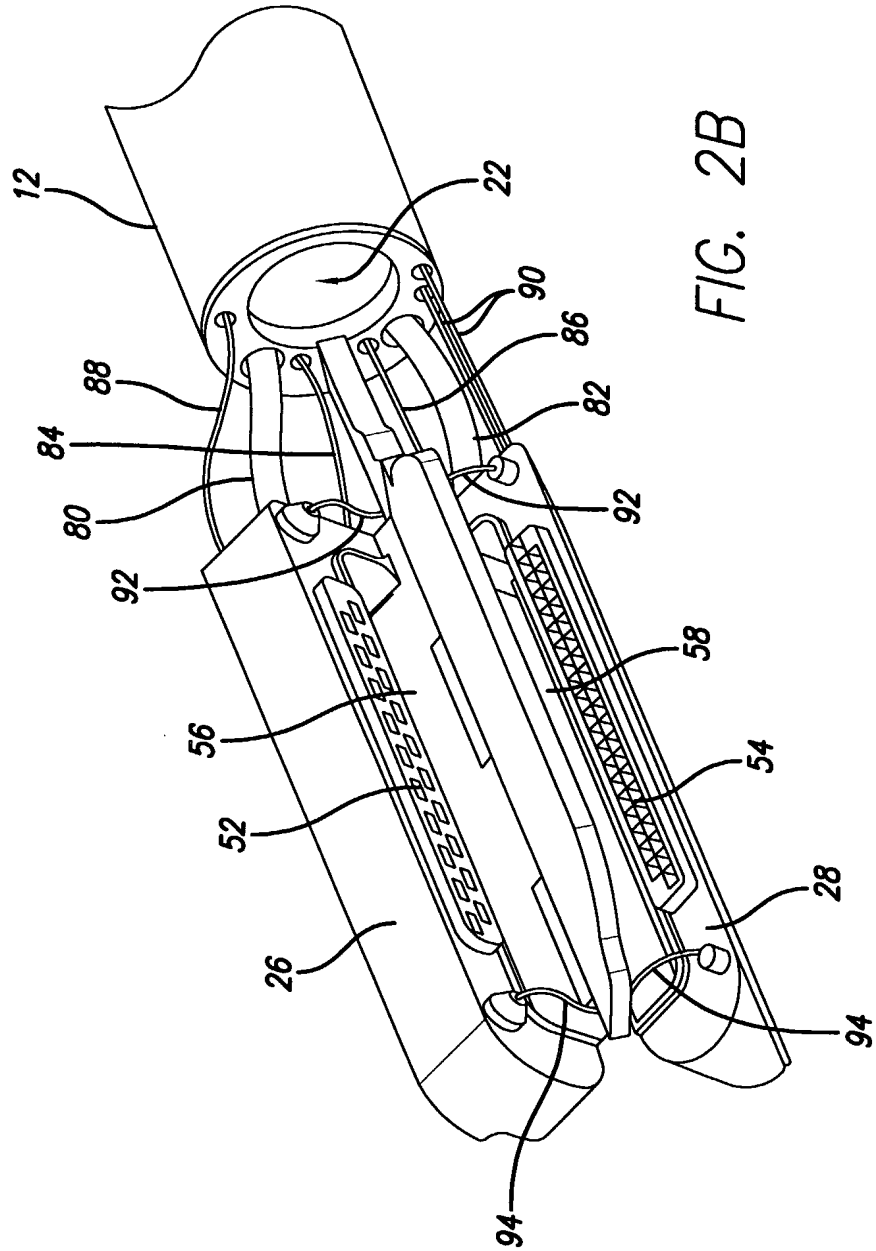
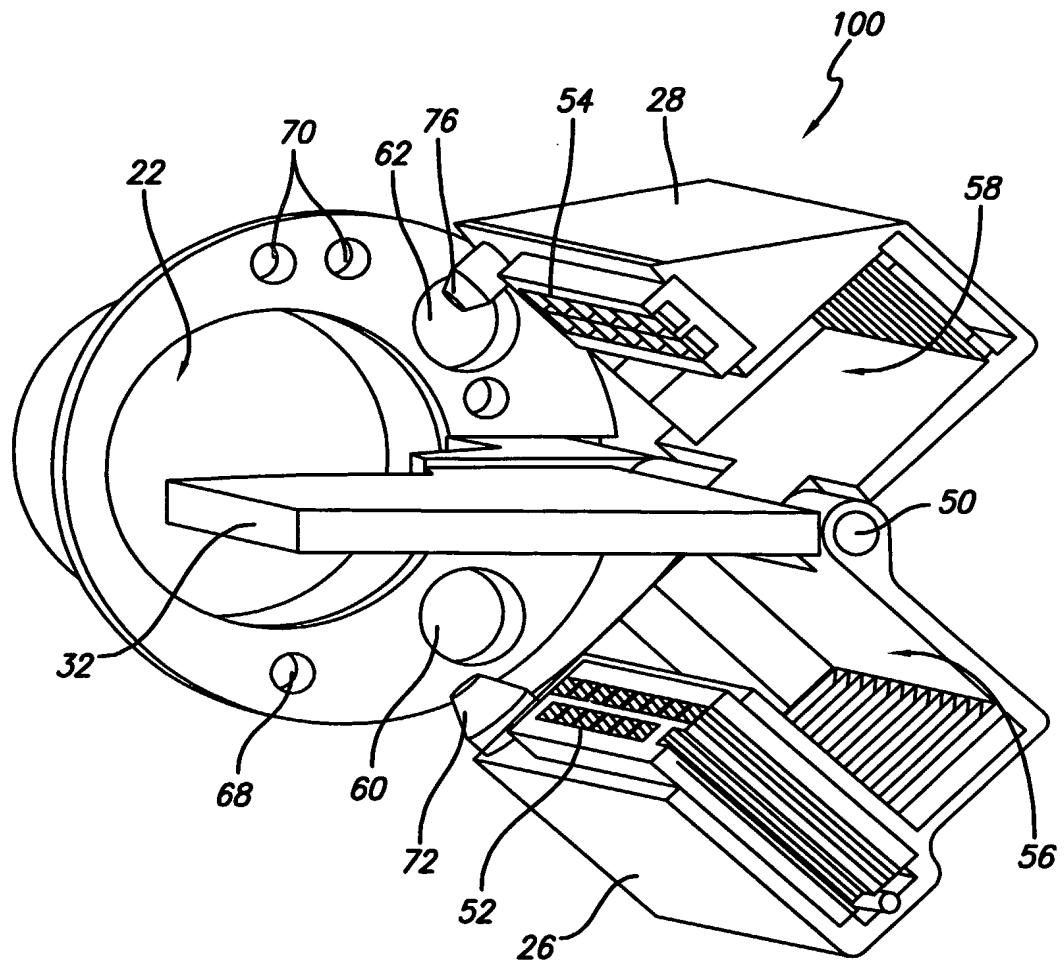


FIG. 1B









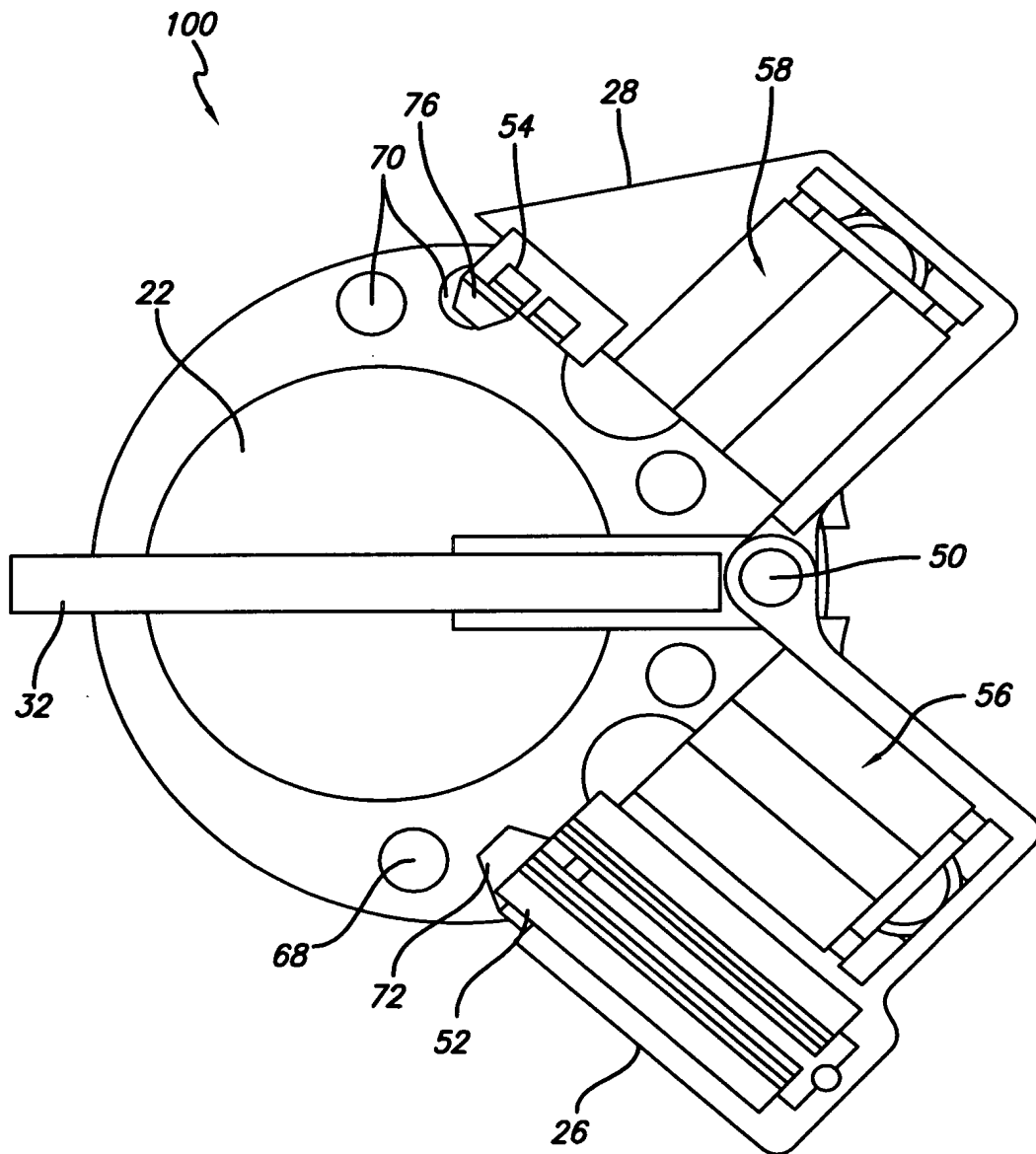


FIG. 3B

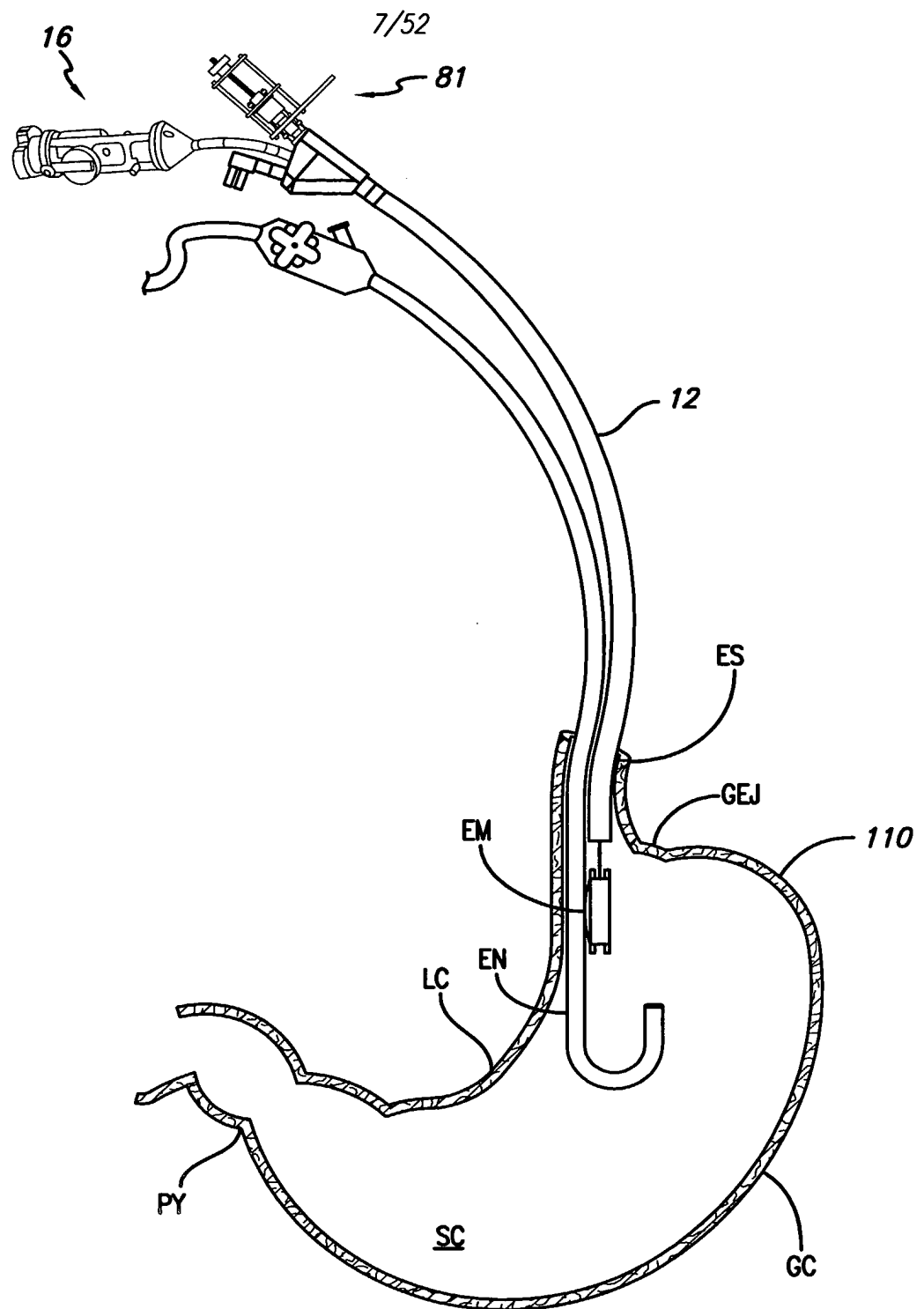
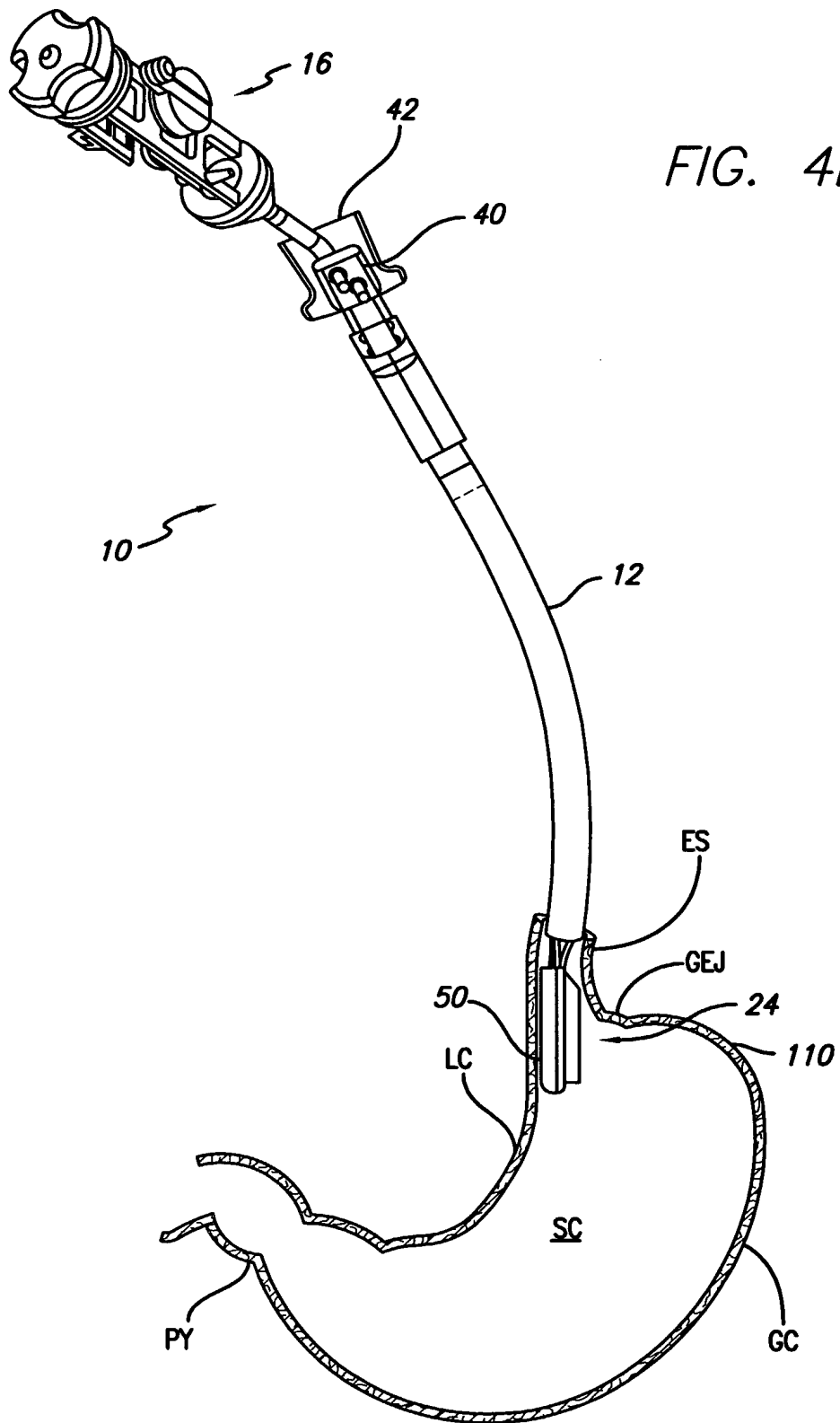


FIG. 4A

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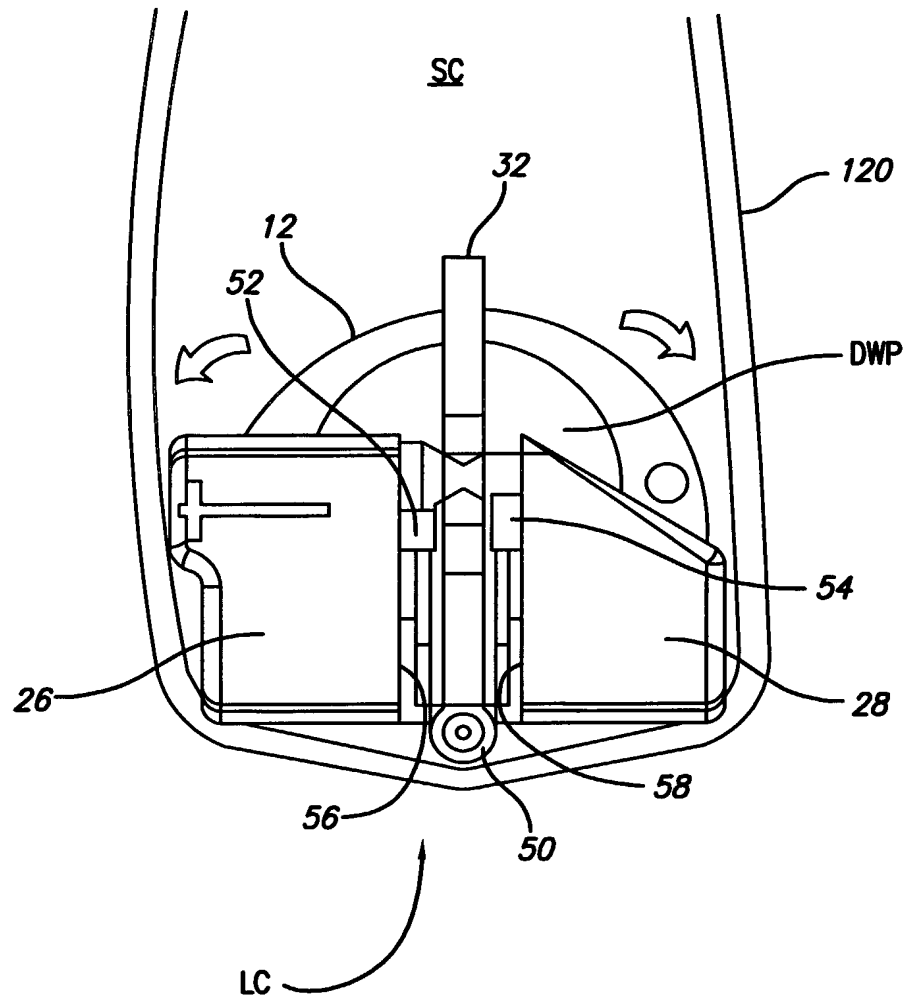


FIG. 5A

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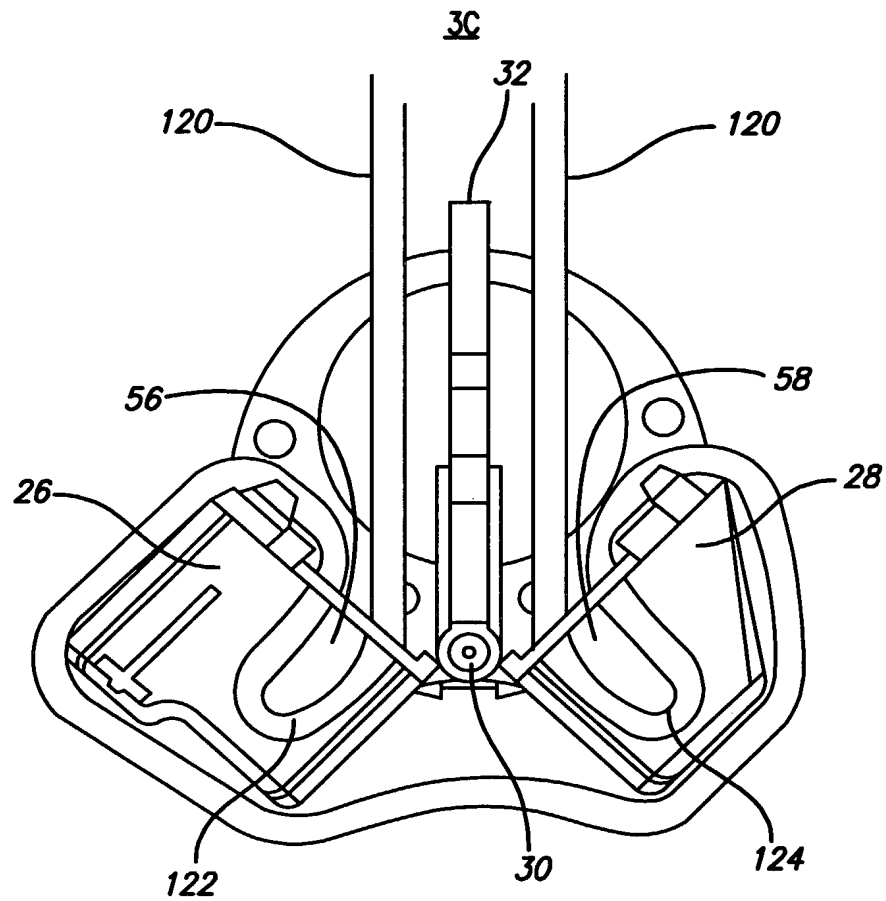


FIG. 5B

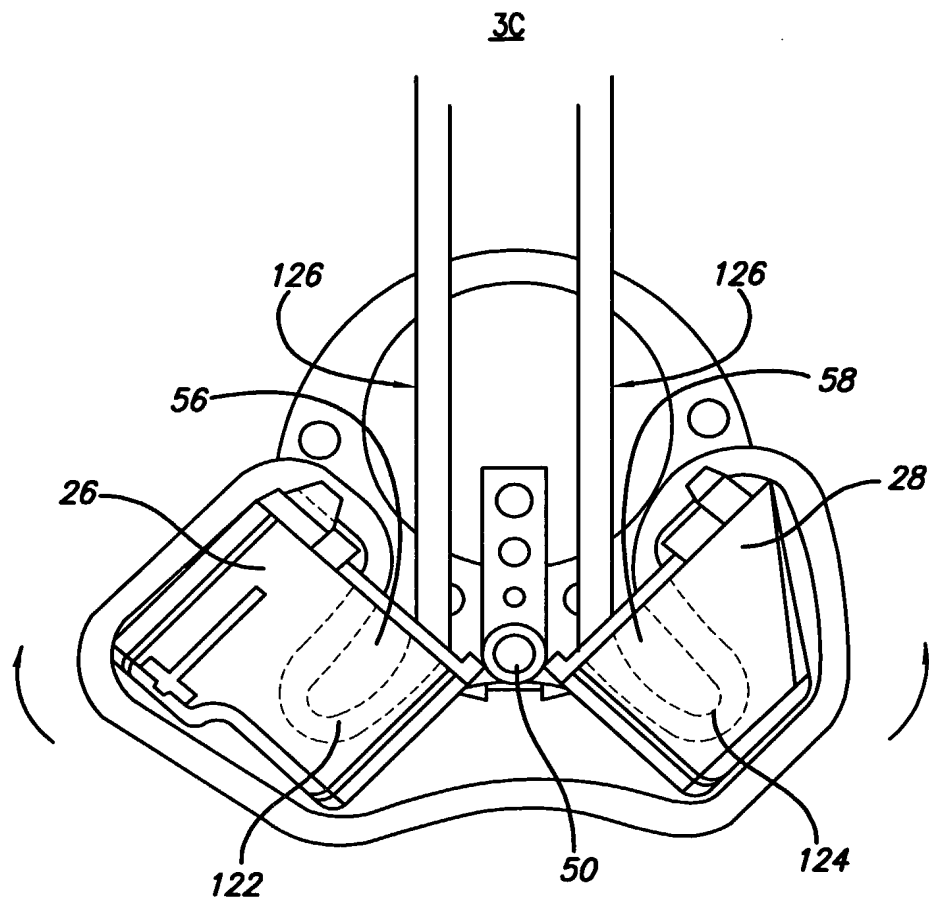


FIG. 5C

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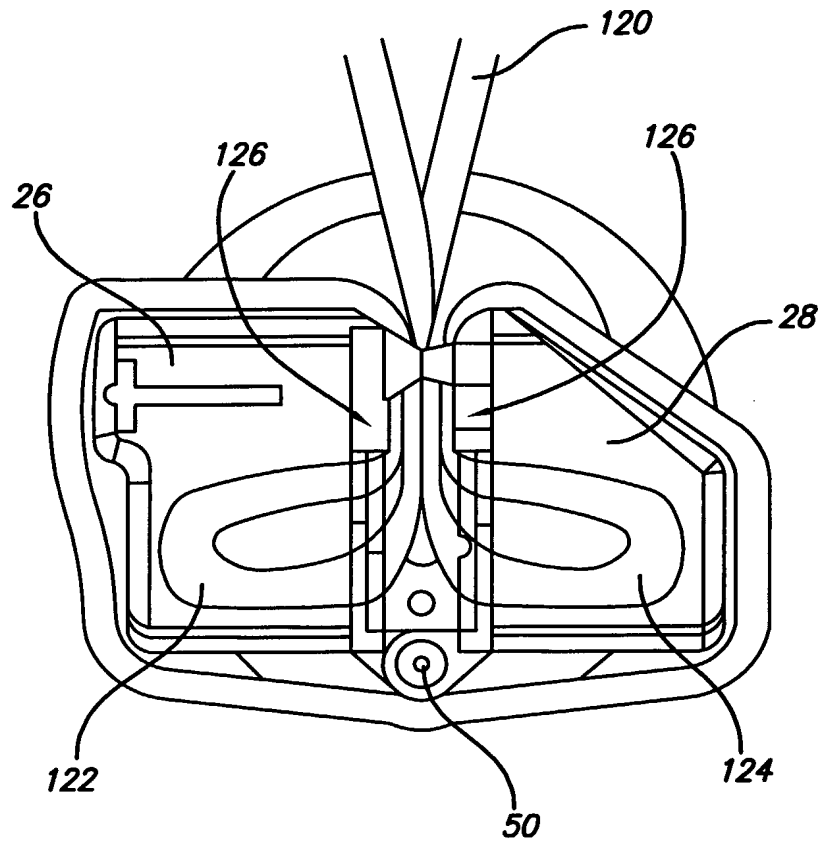


FIG. 5D

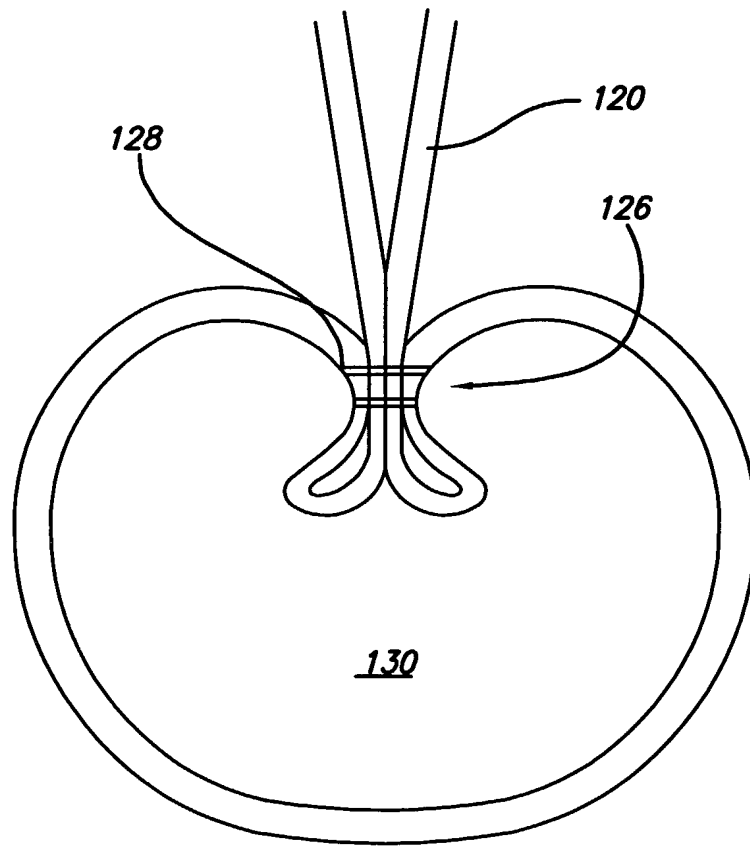


FIG. 5E



DWP

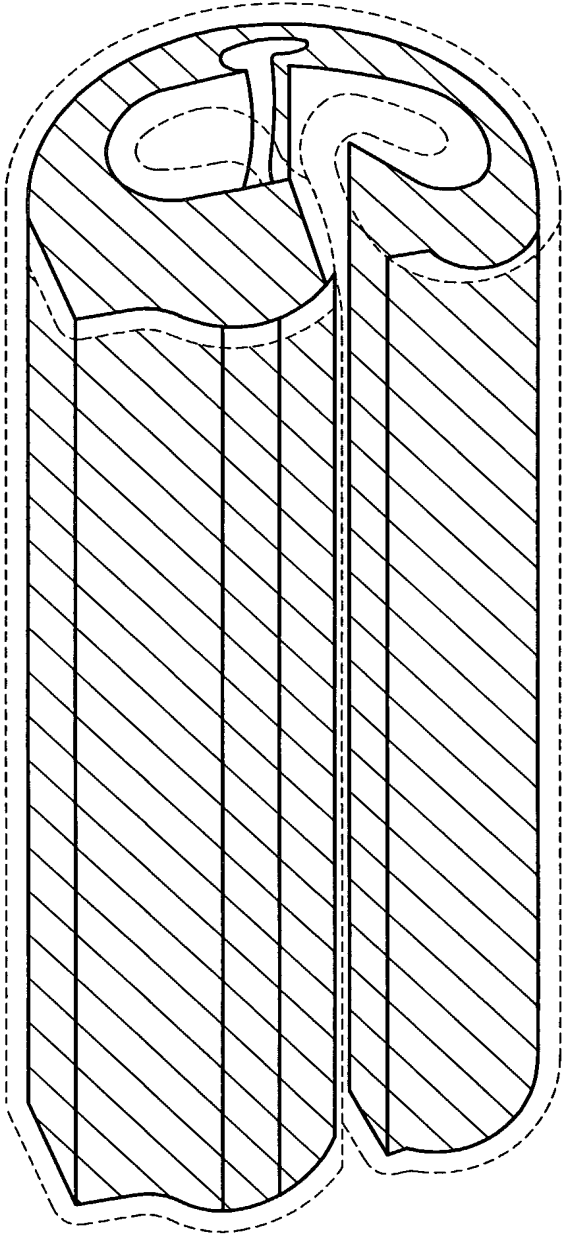


FIG. 5F

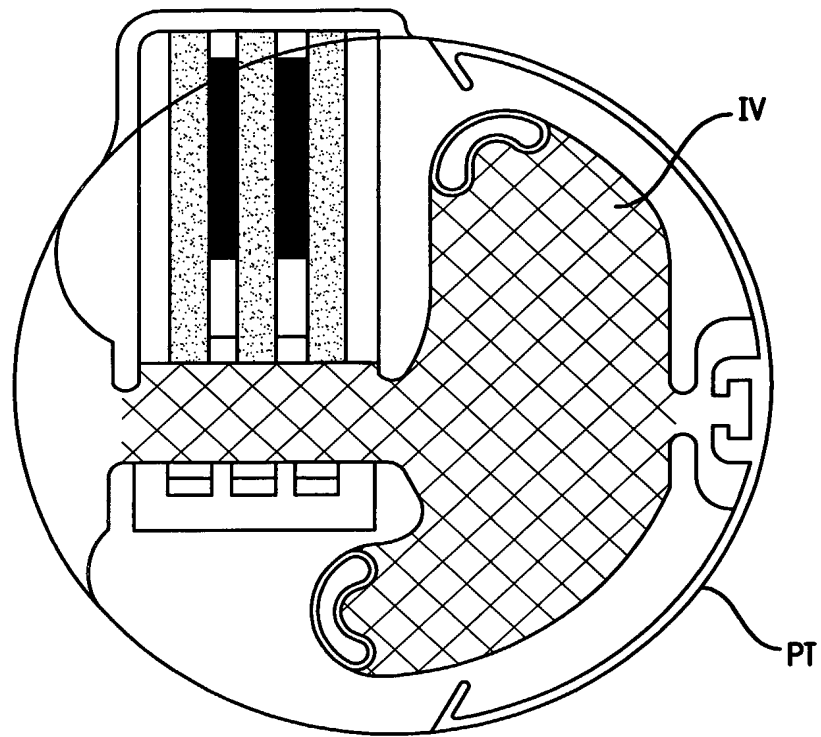
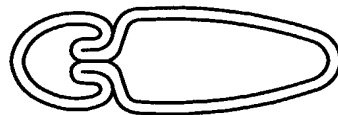
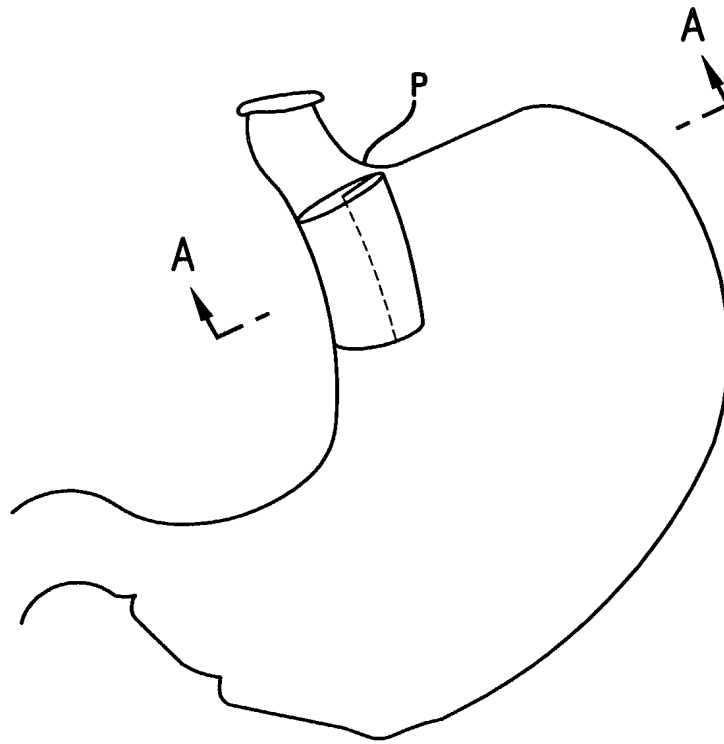


FIG. 5G

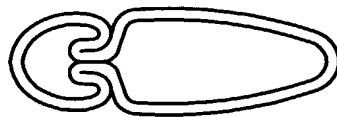
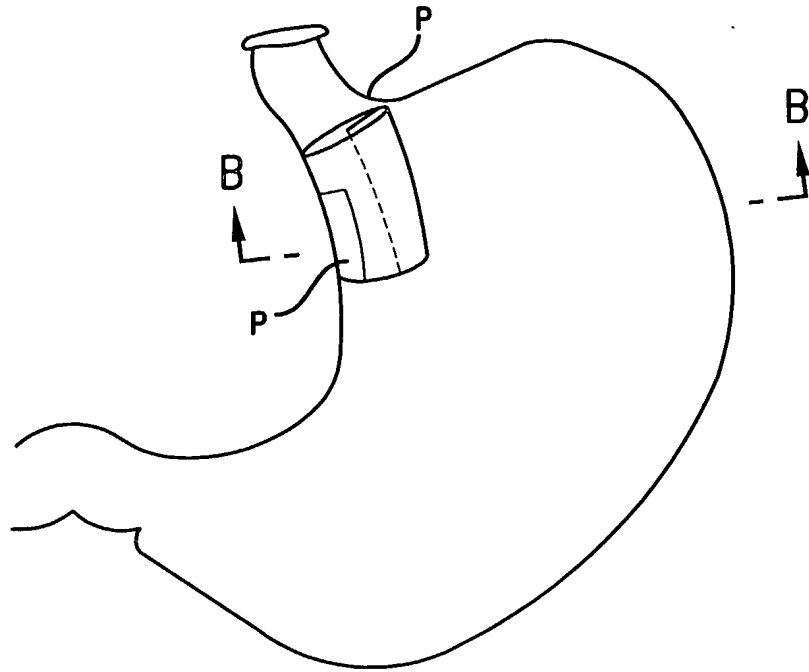
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A-A

FIG. 5H

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B-B

FIG. 51

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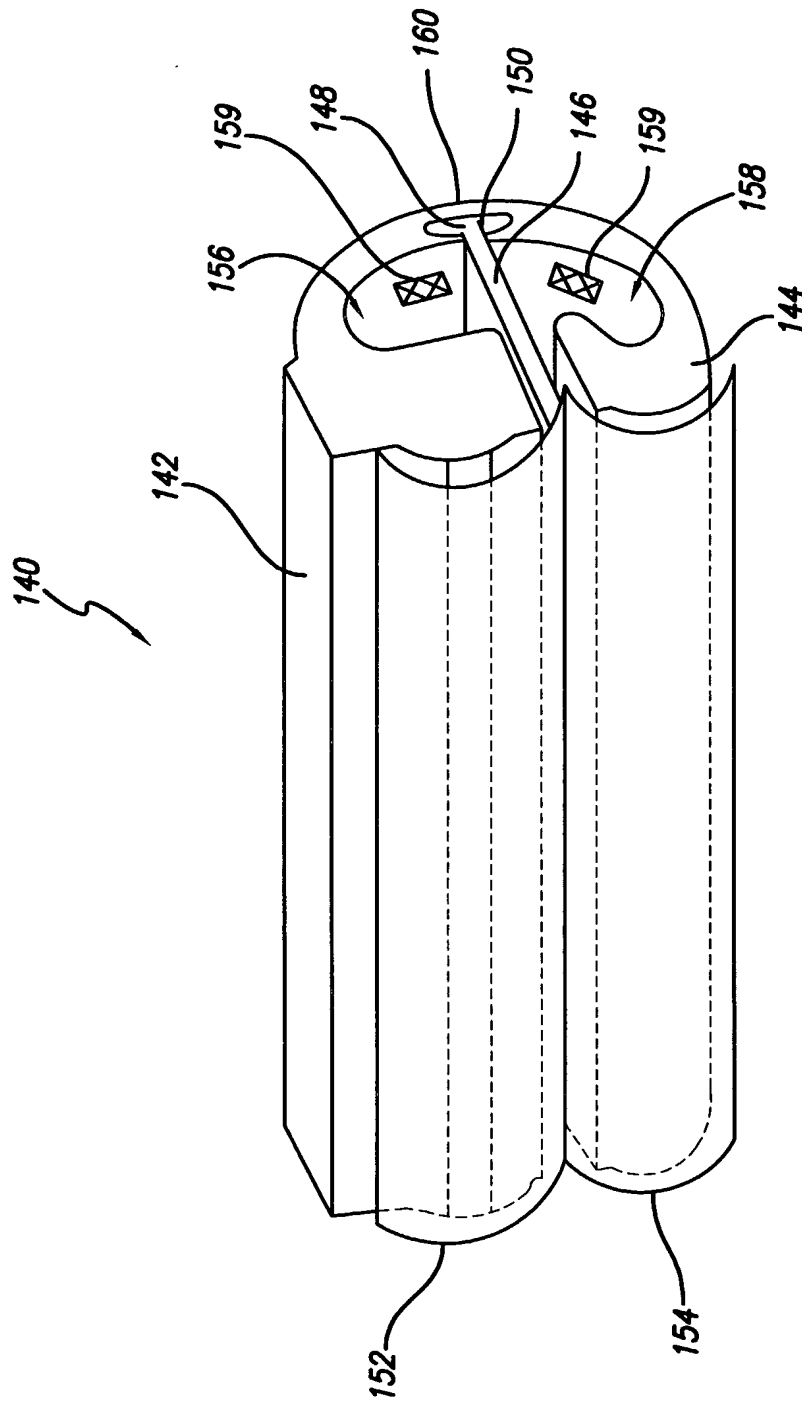


FIG. 6A

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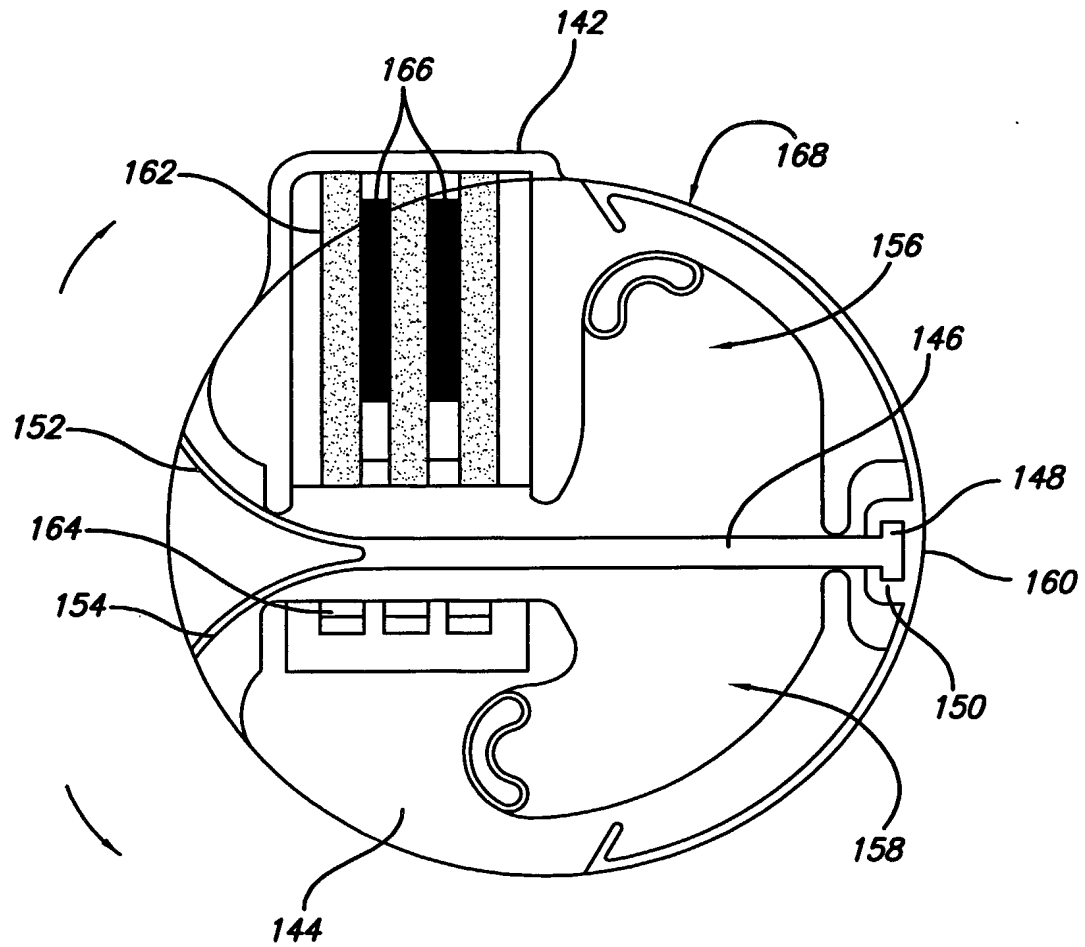


FIG. 6B

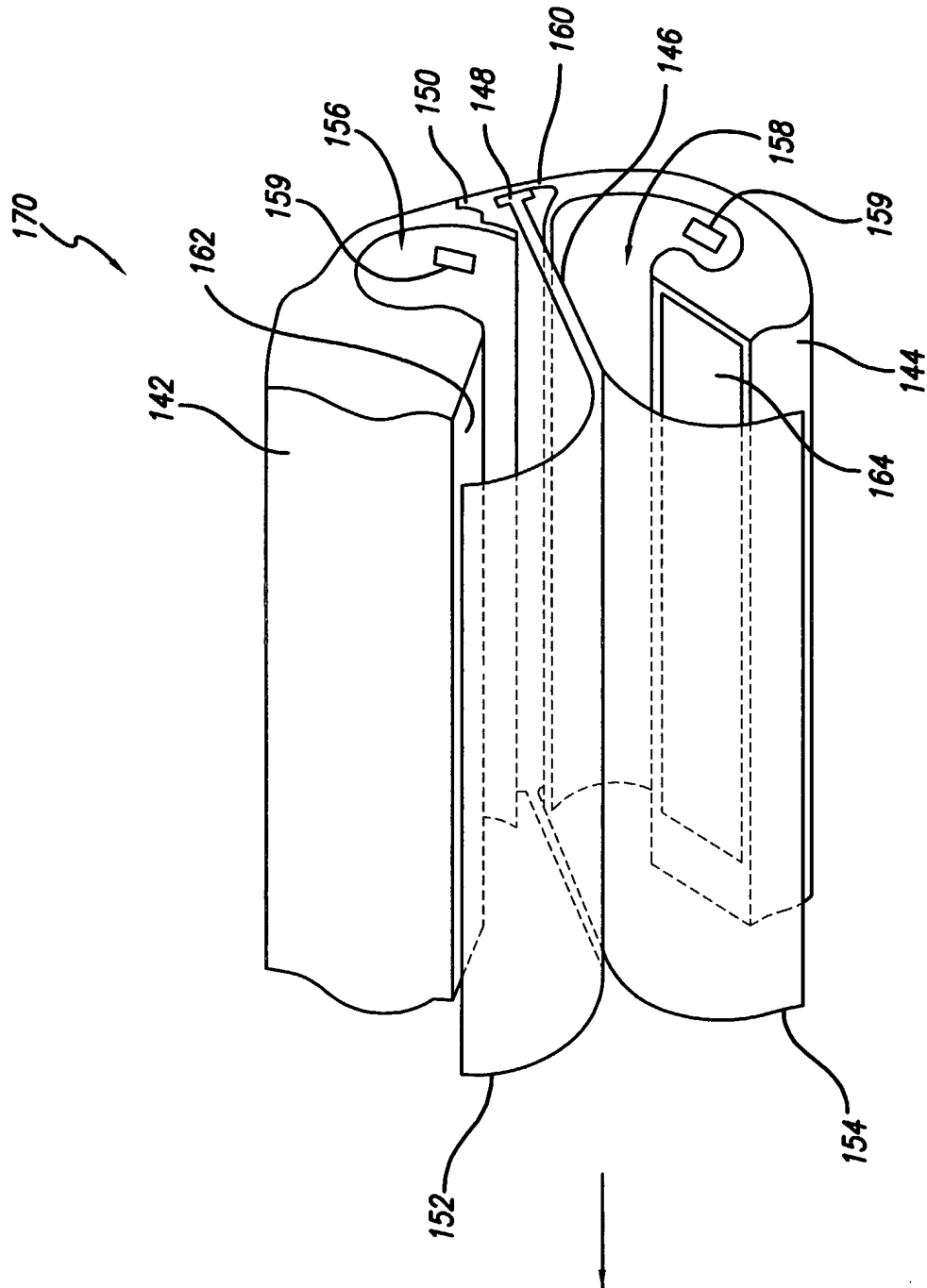


FIG. 7A

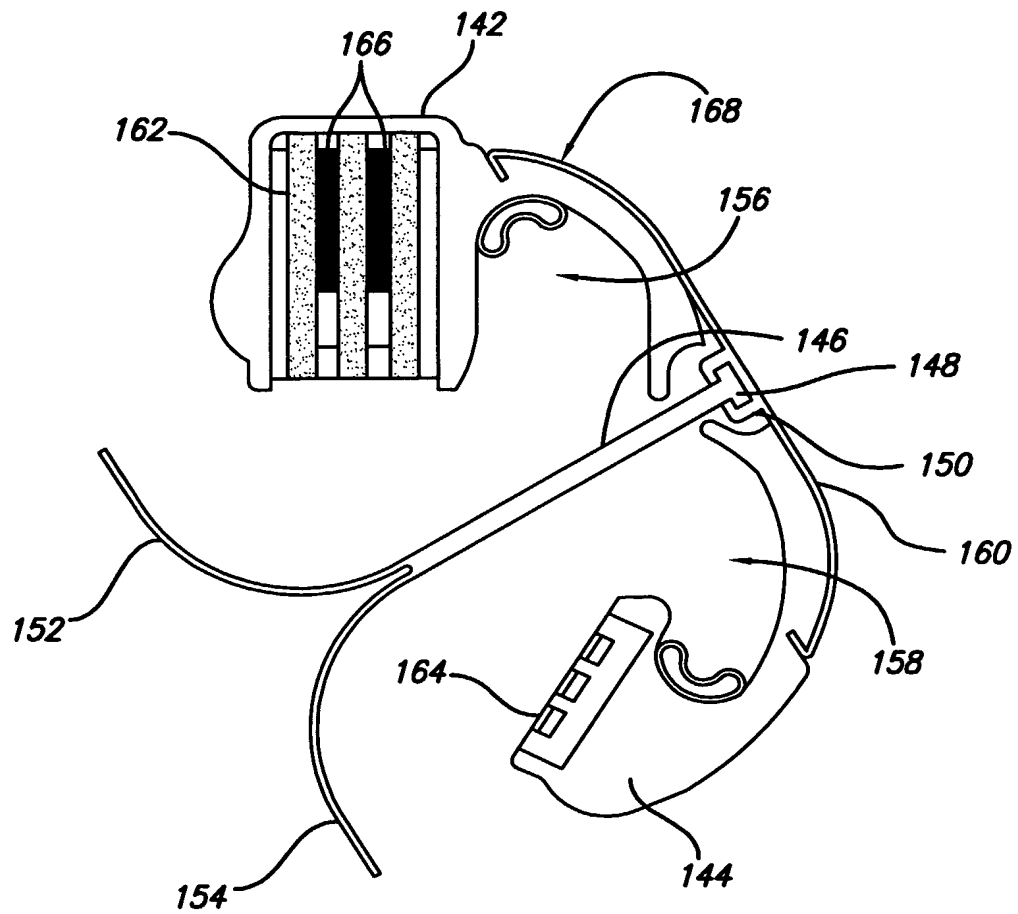


FIG. 7B



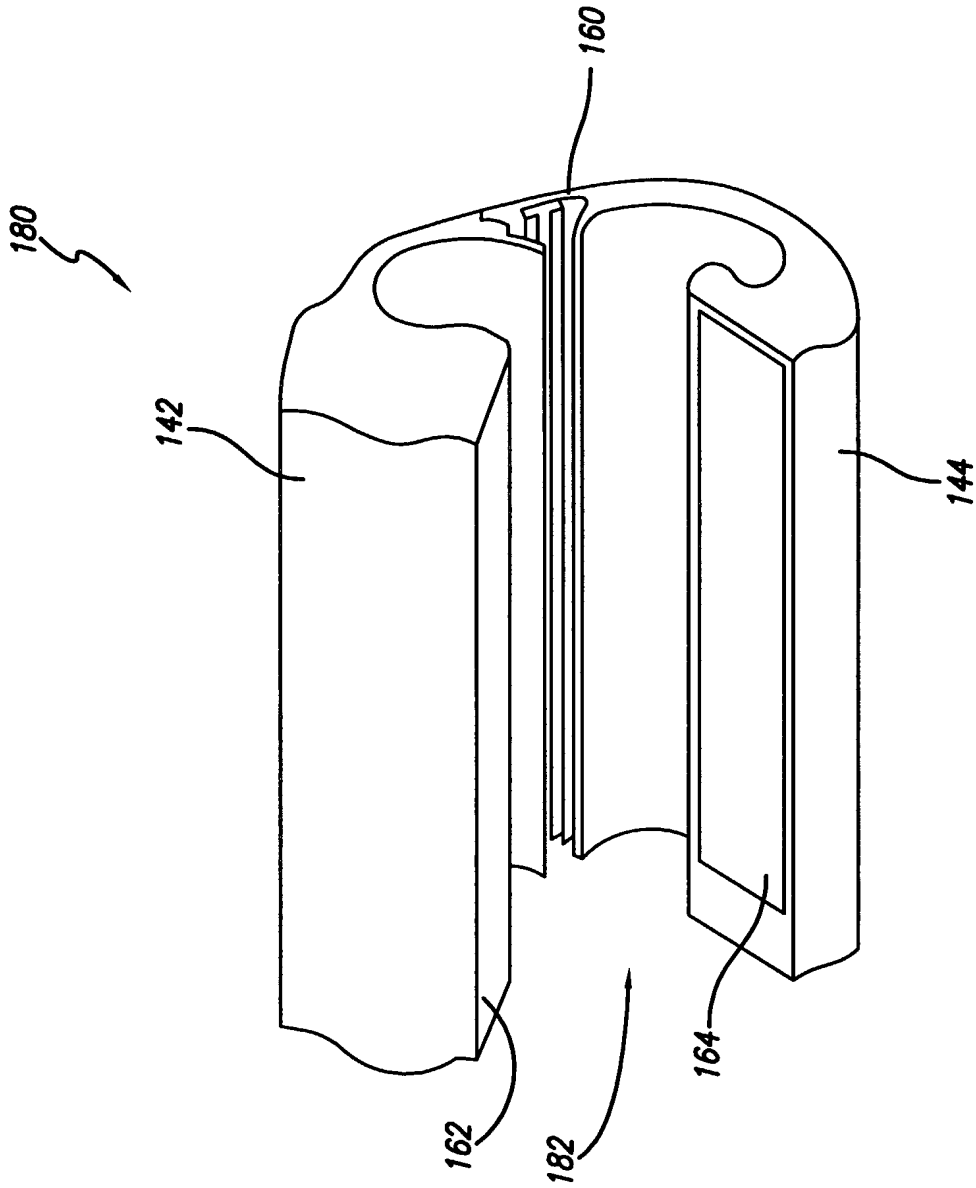


FIG. 8A

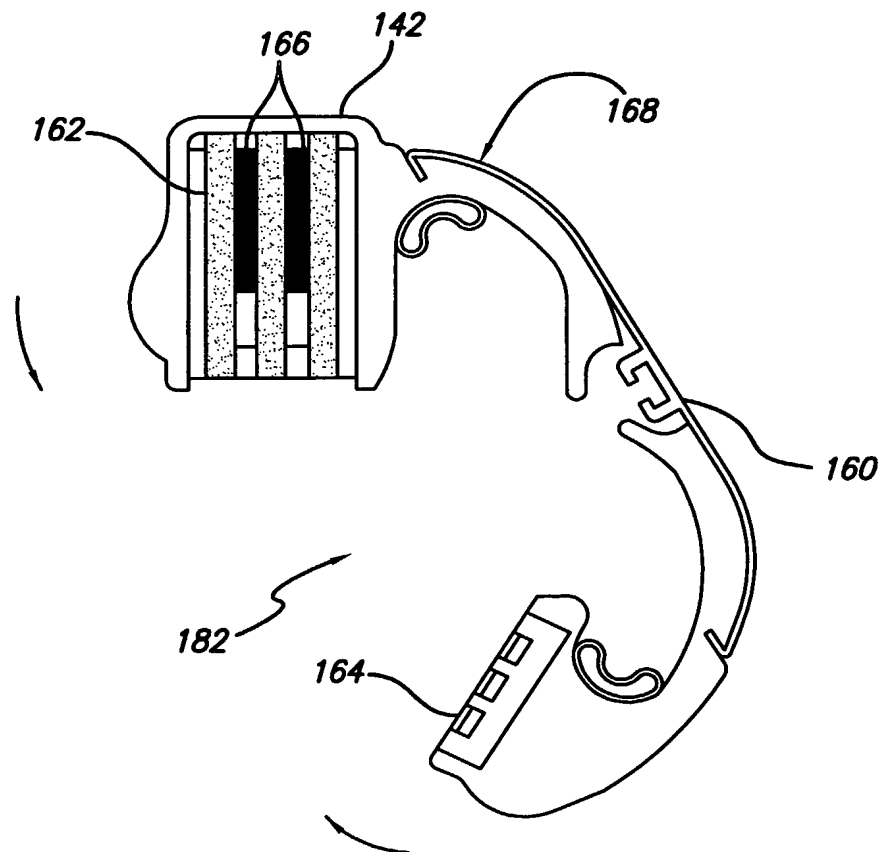
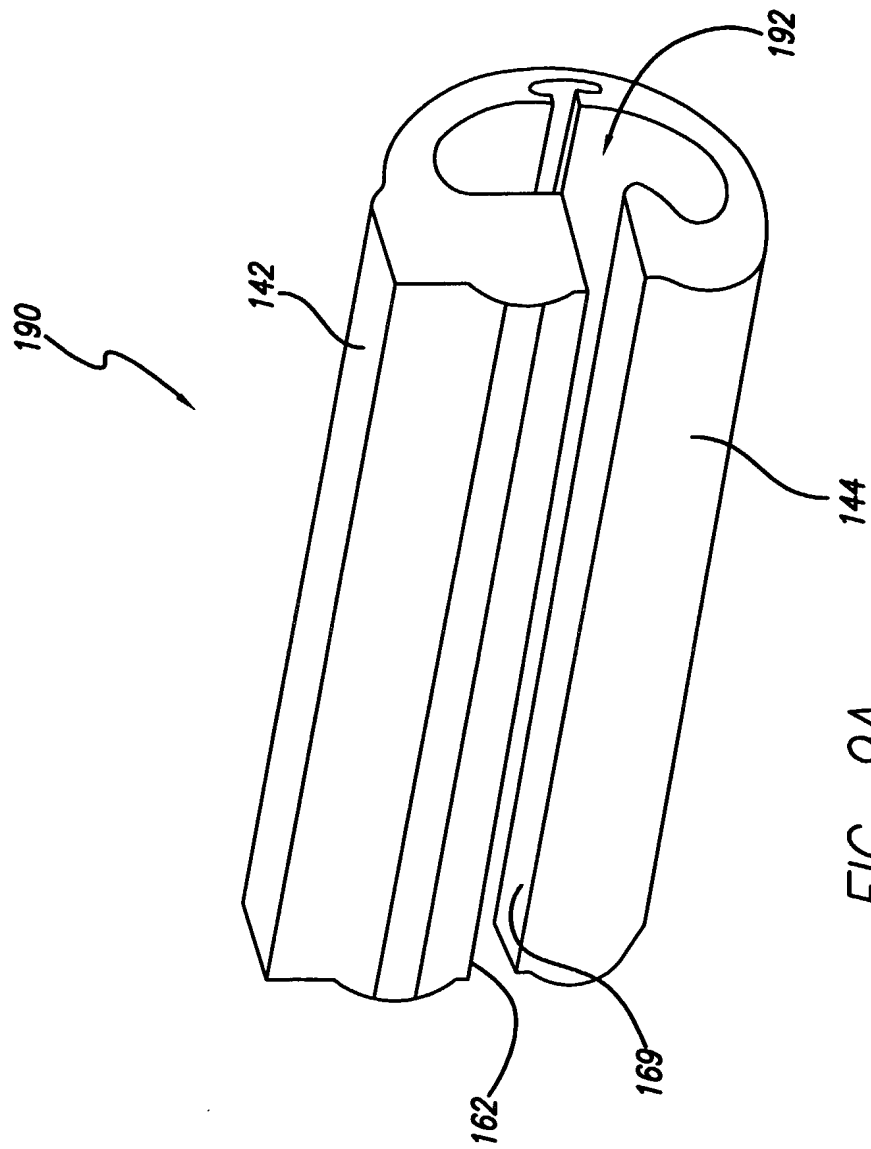


FIG. 8B



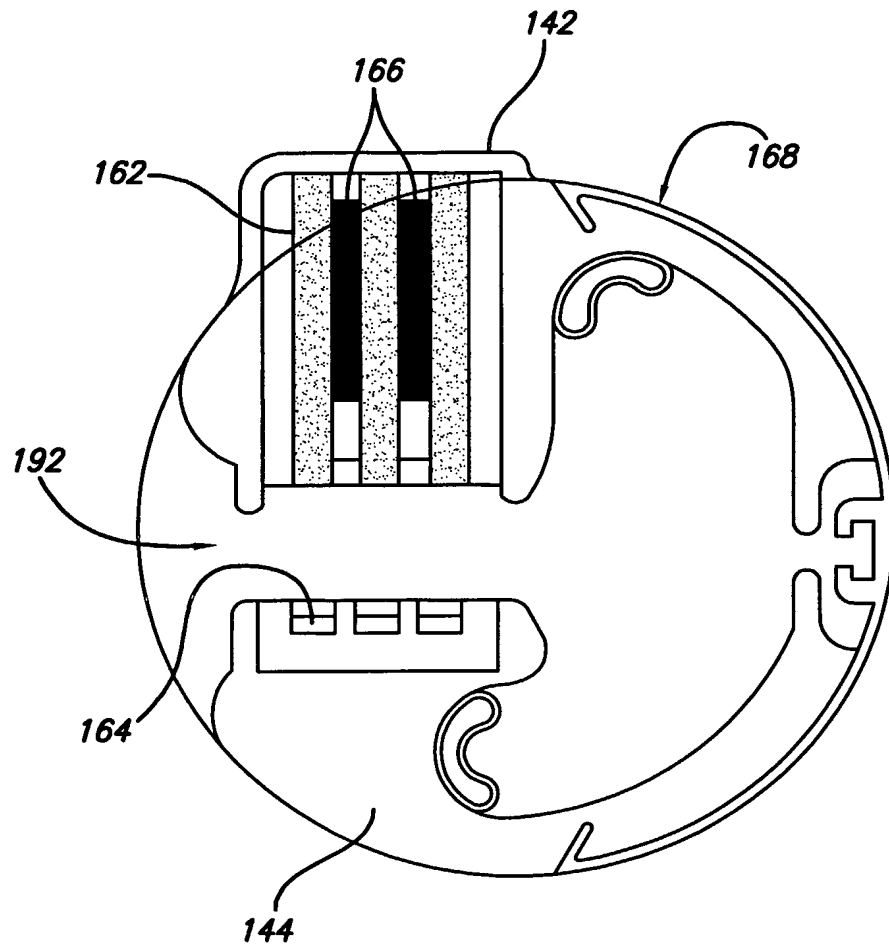


FIG. 9B

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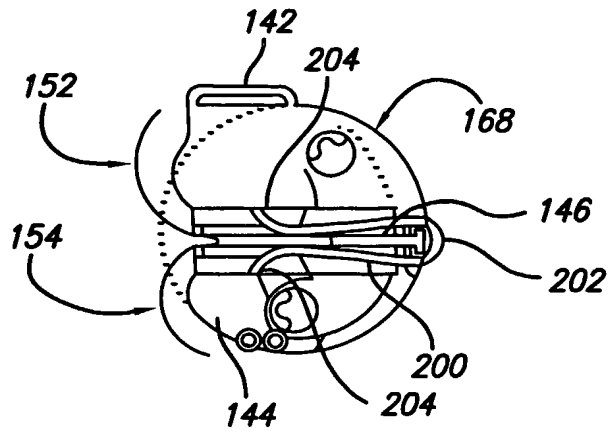


FIG. 10A

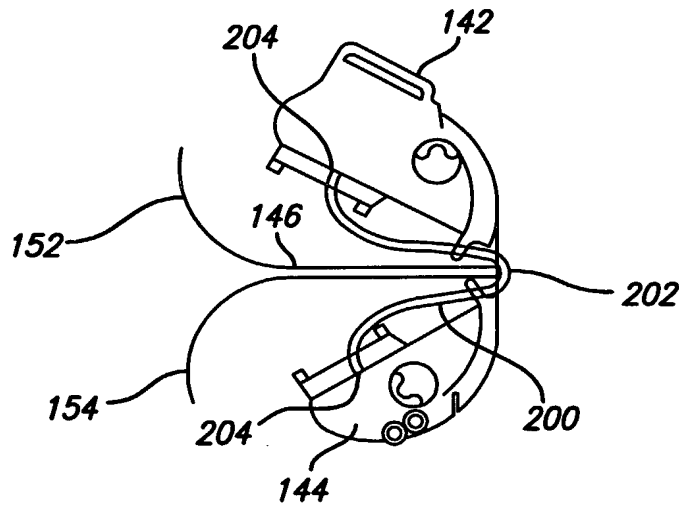


FIG. 10B

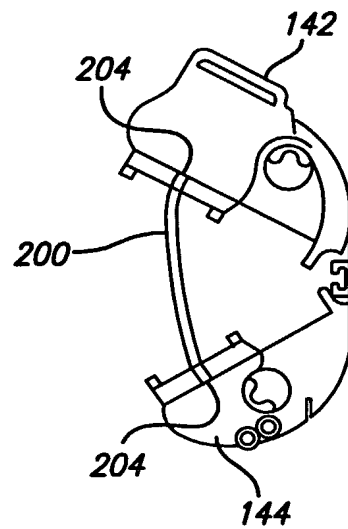


FIG. 10C

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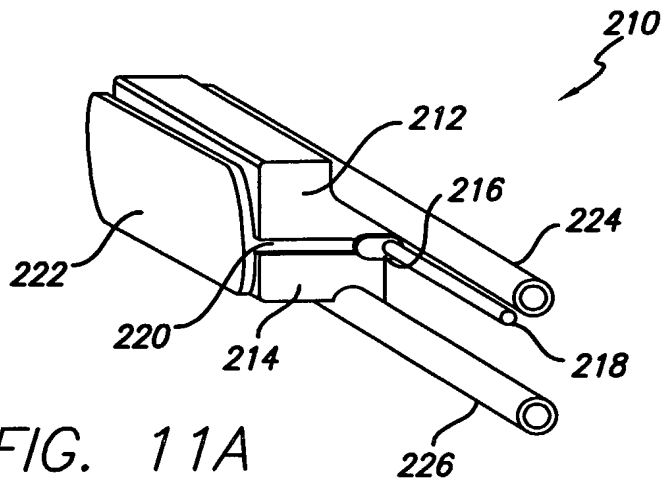


FIG. 11A

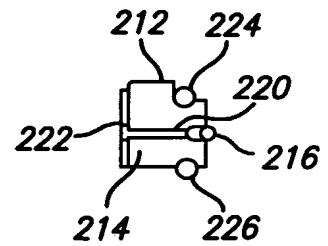


FIG. 11B

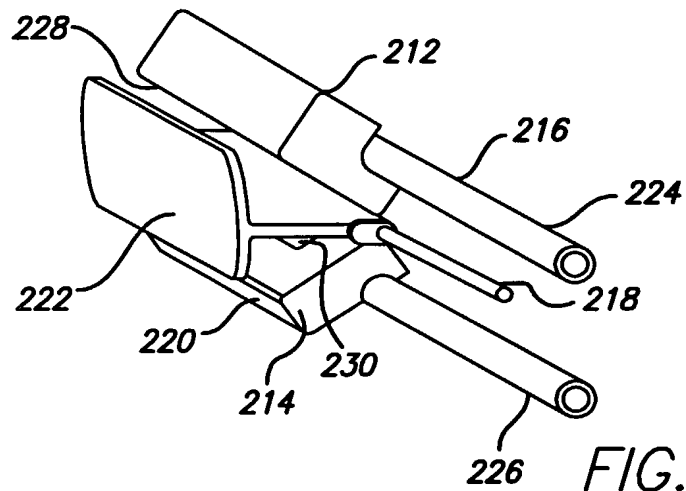


FIG. 11C

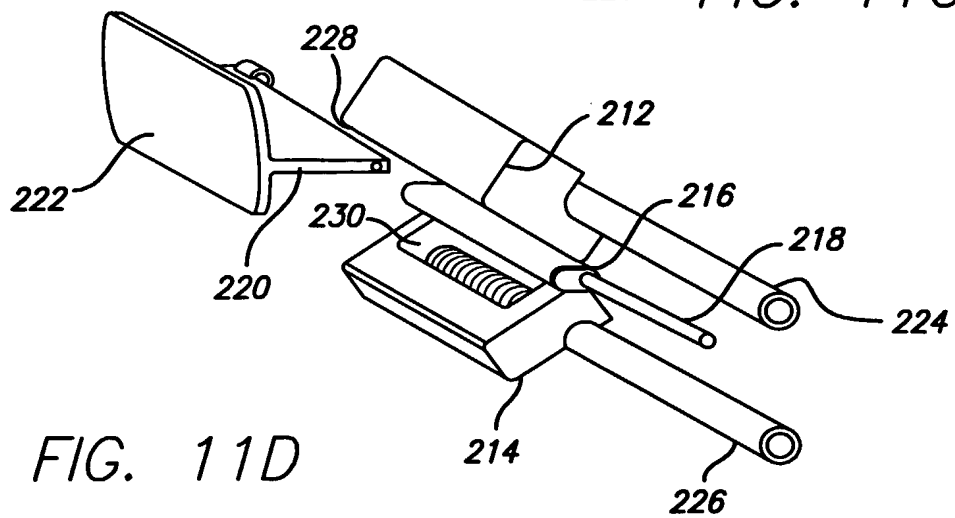


FIG. 11D

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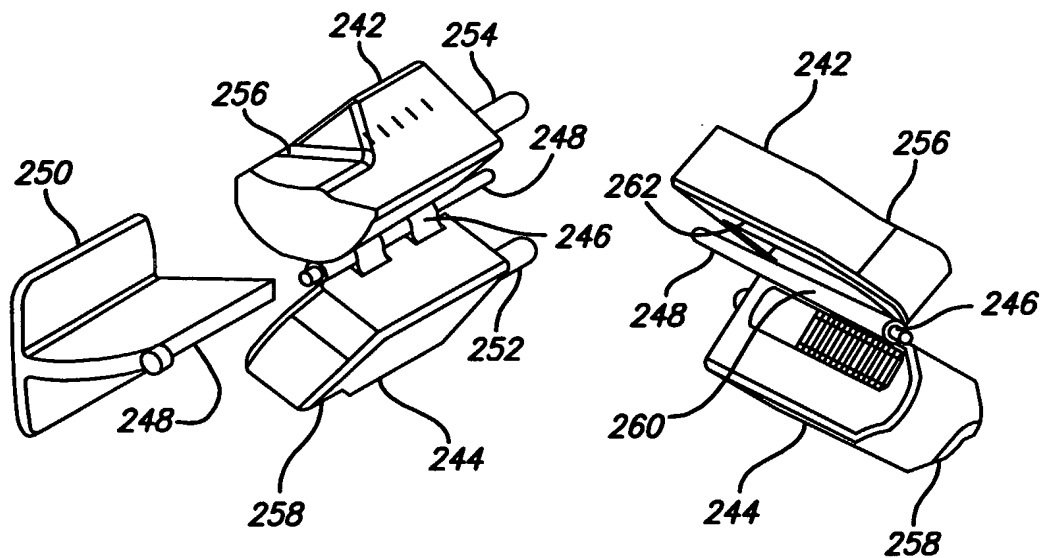
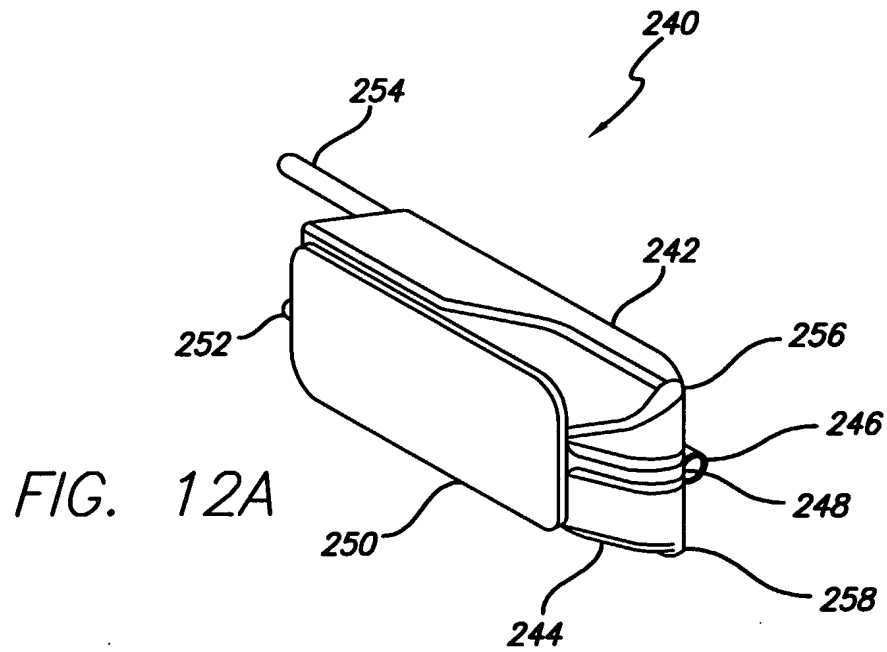


FIG. 12B

FIG. 12C

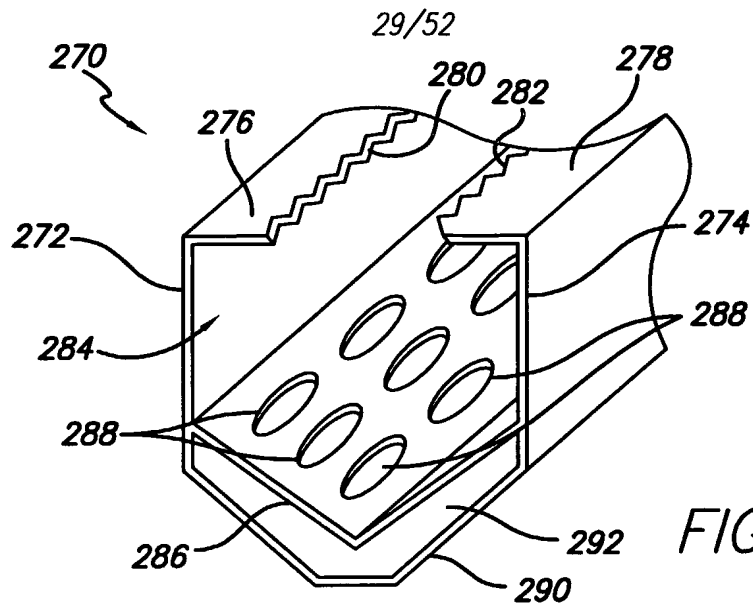


FIG. 13A

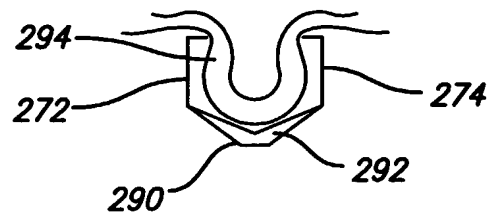


FIG. 13B

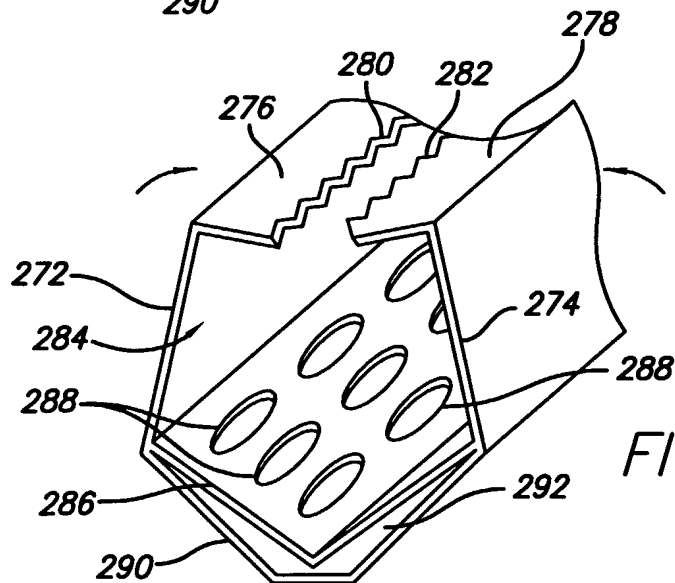


FIG. 13C

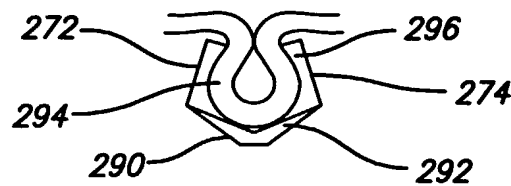


FIG. 13D



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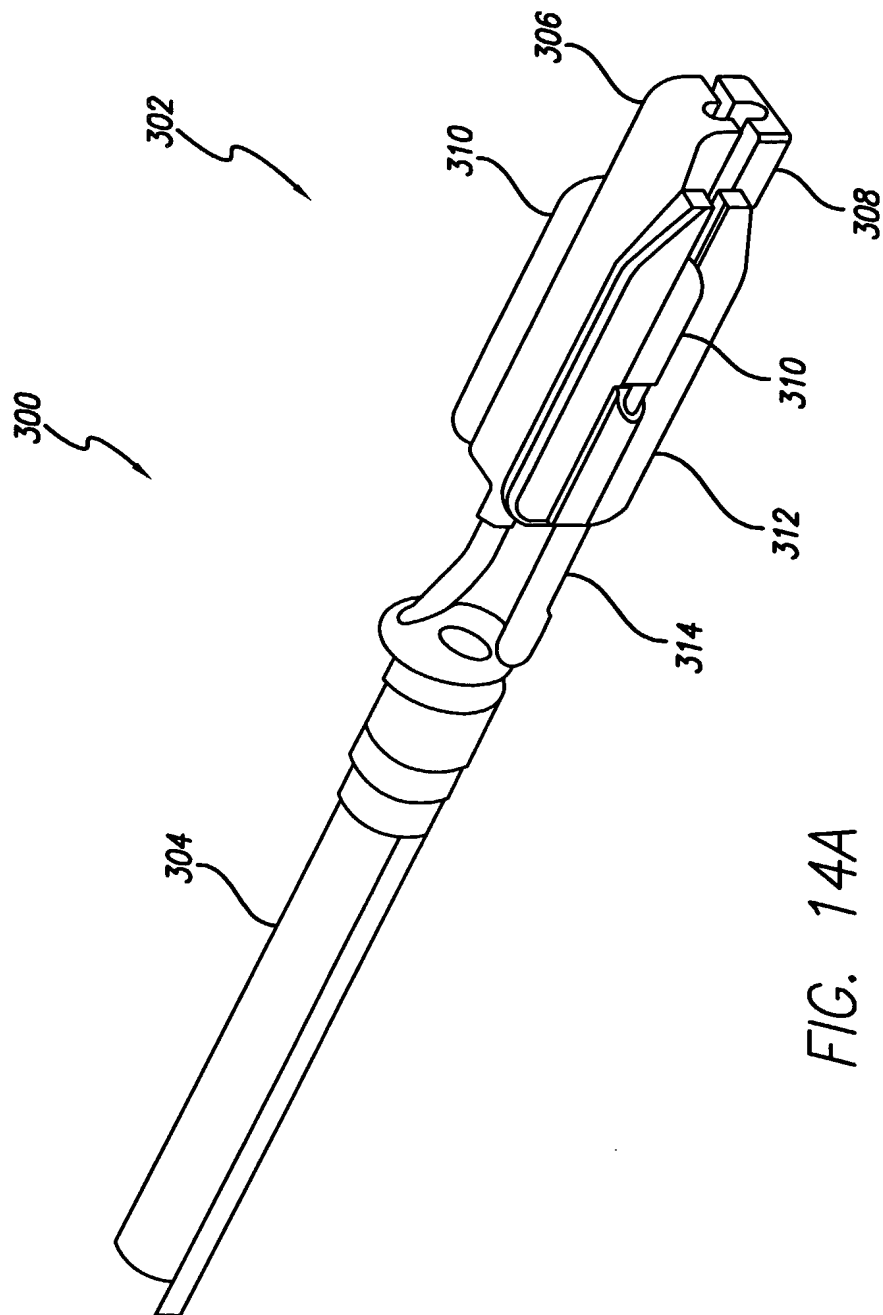


FIG. 14A

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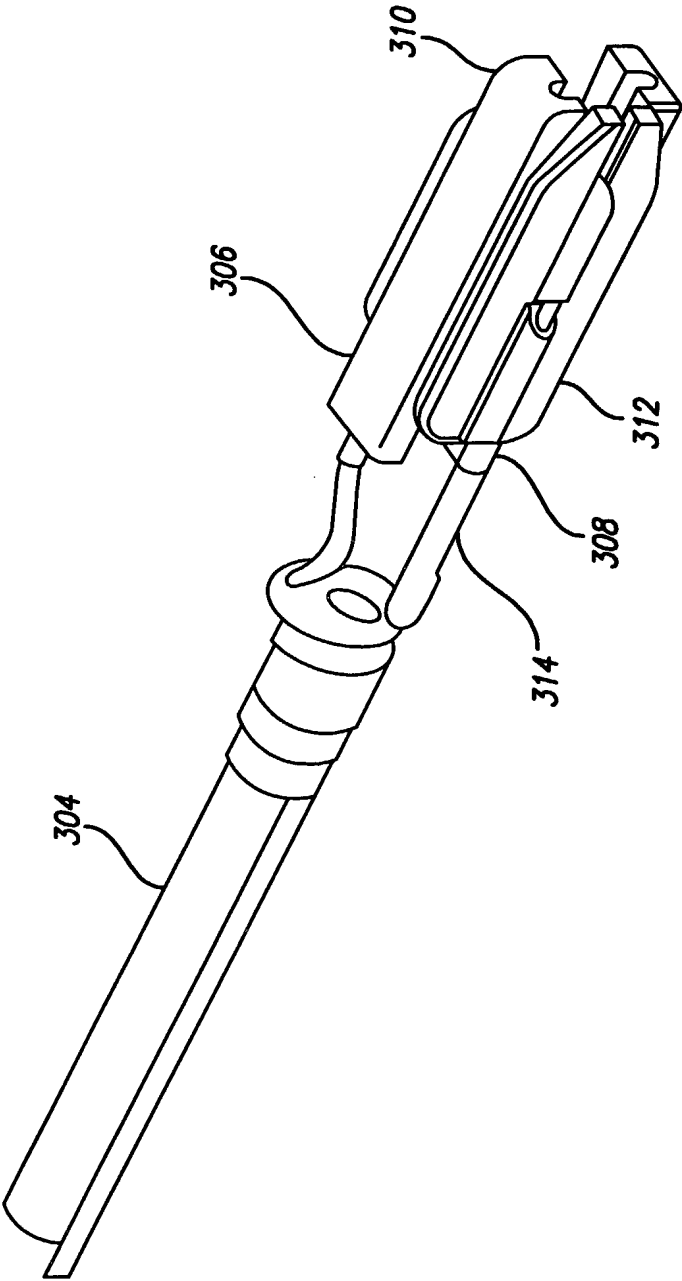


FIG. 14B

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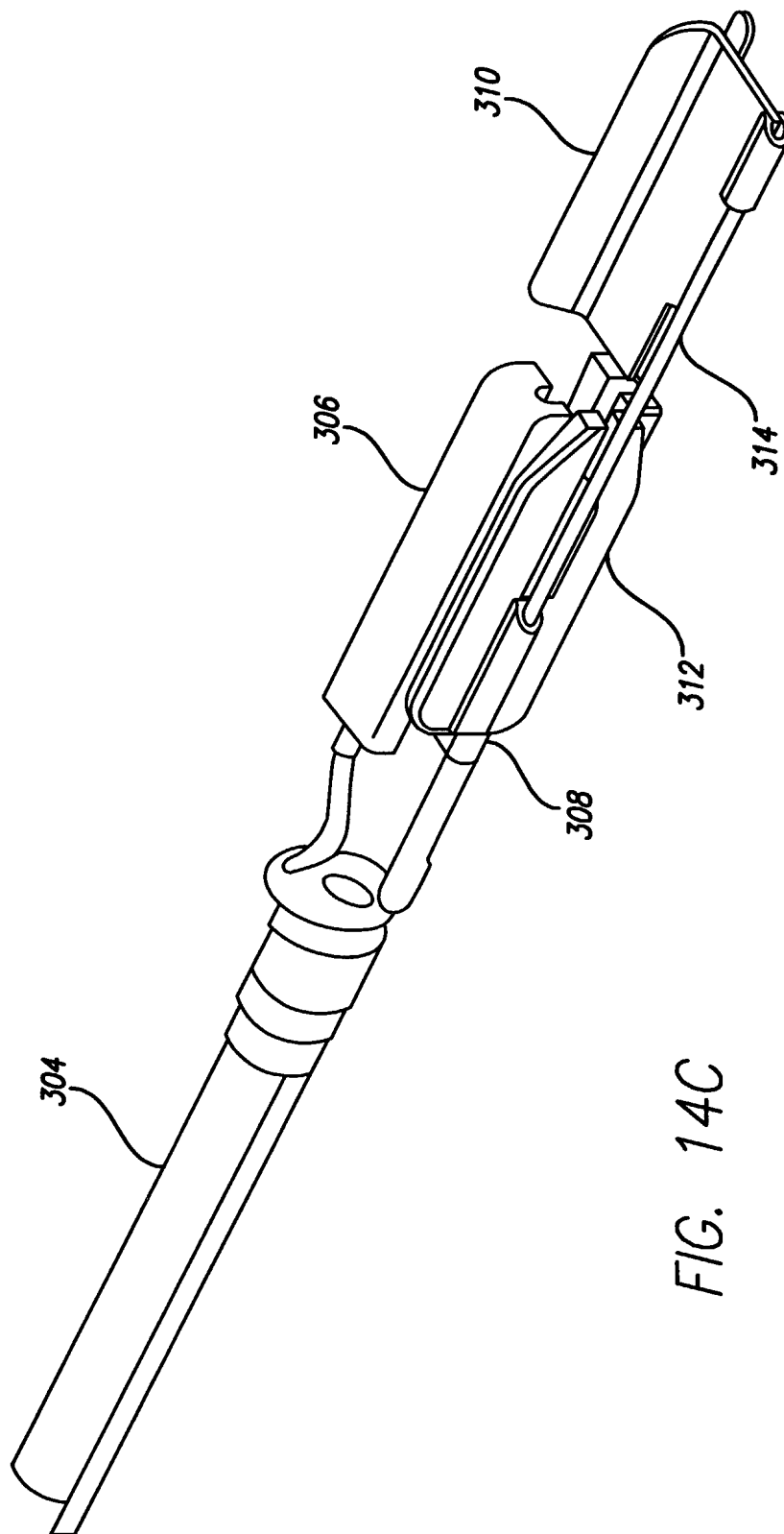


FIG. 14C

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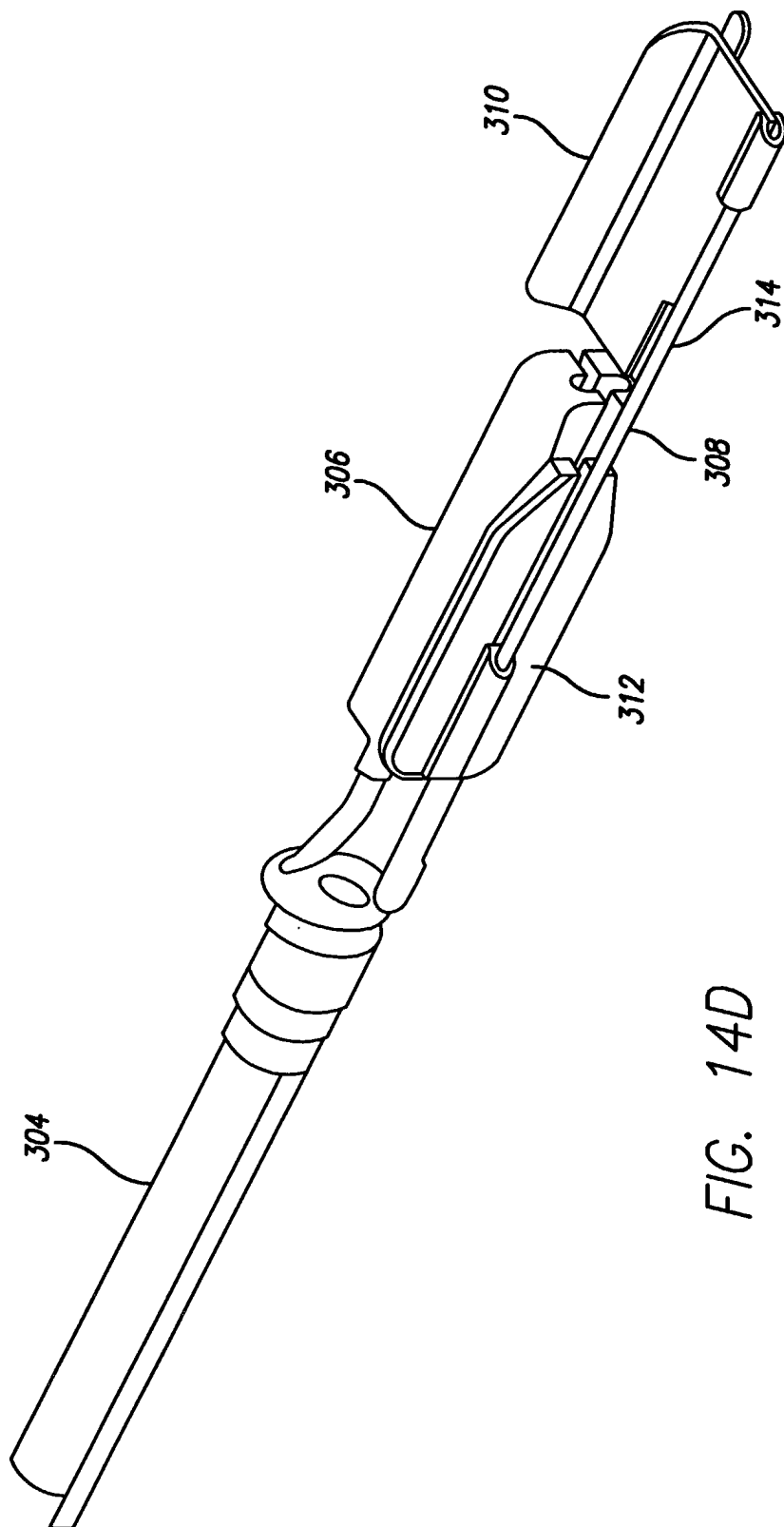


FIG. 14D

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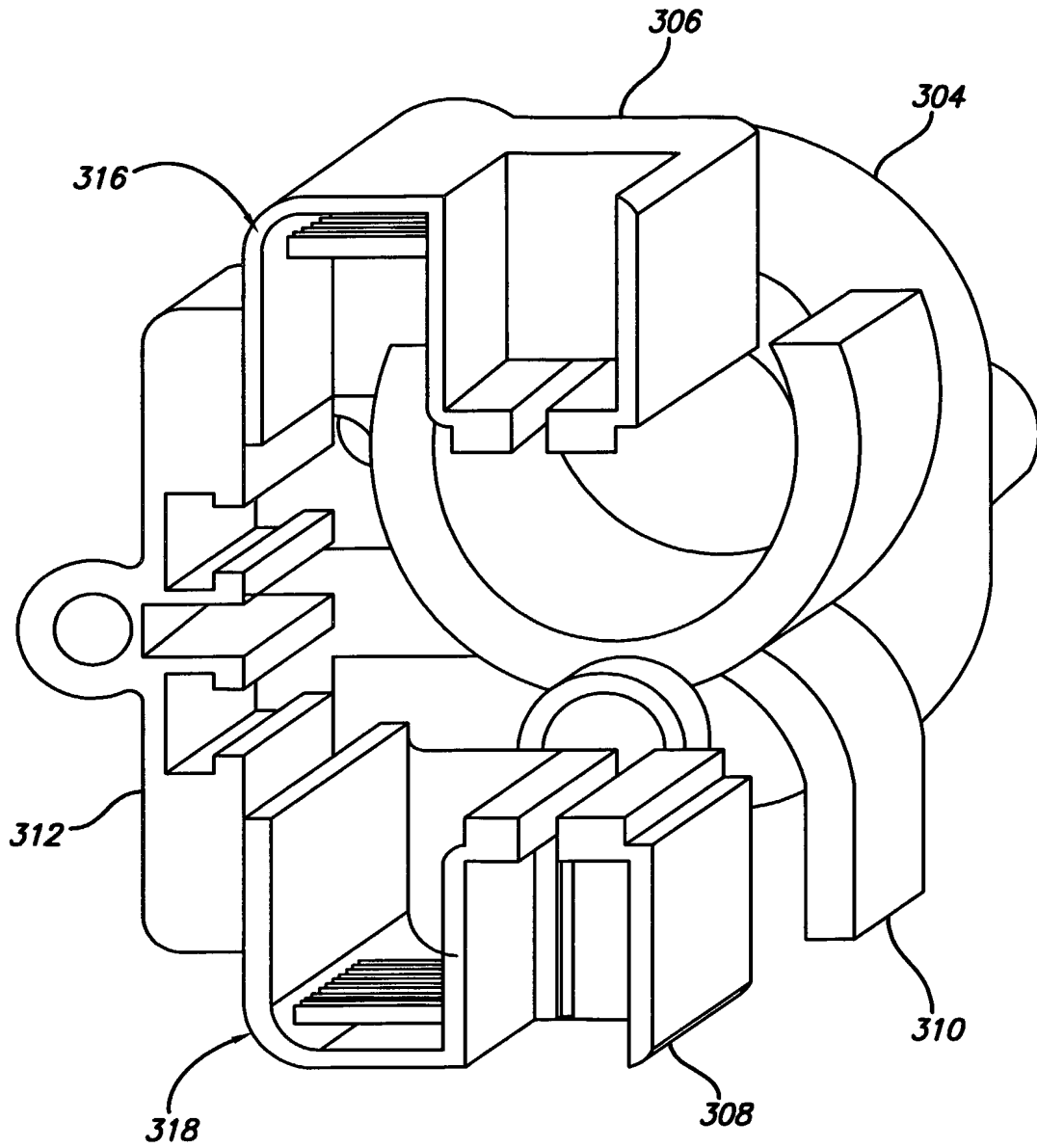


FIG. 14E

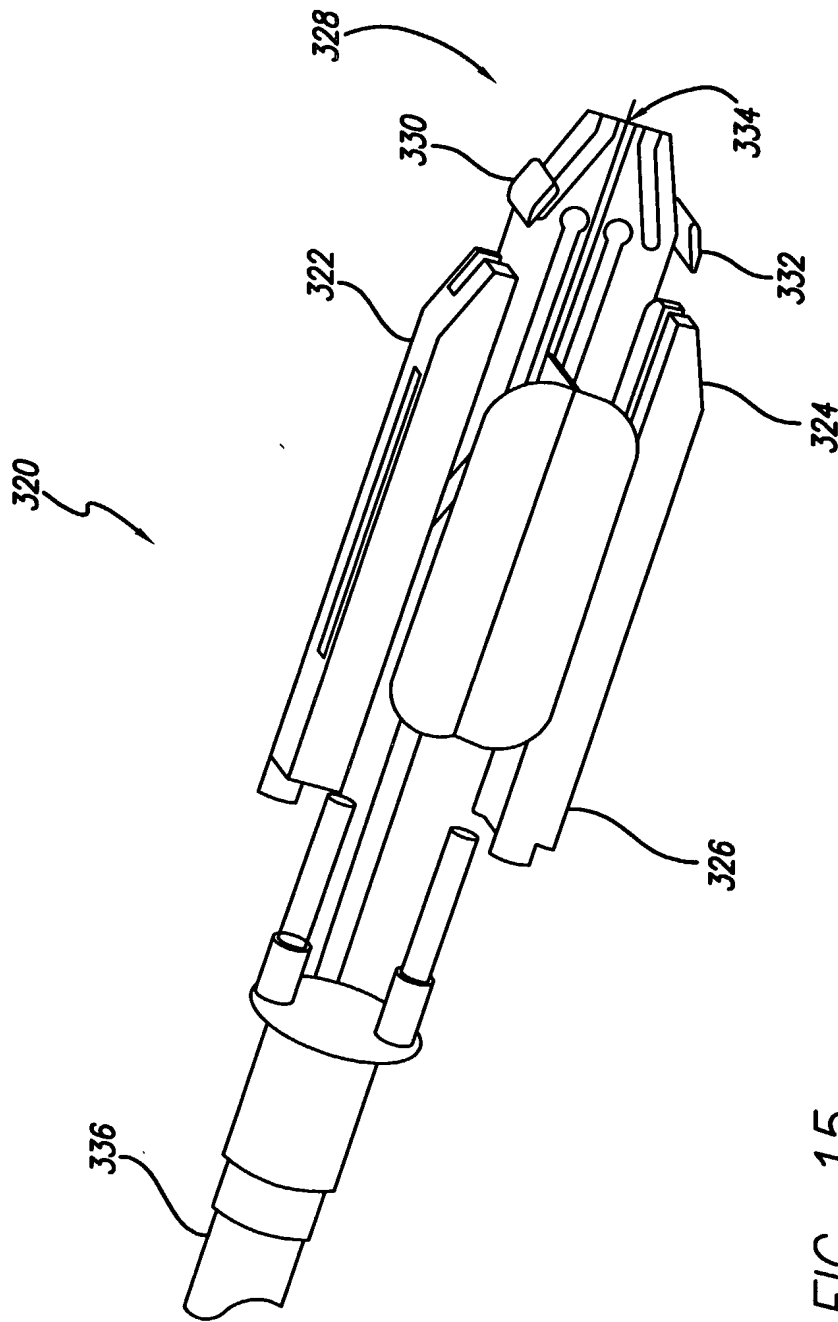


FIG. 15

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FIG. 16A

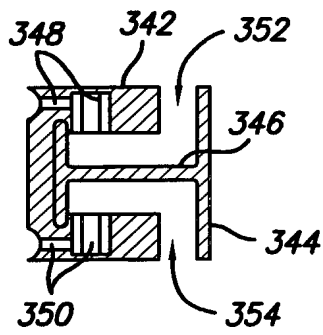
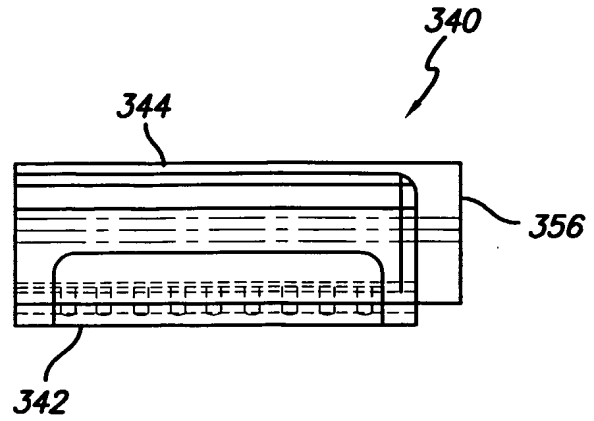


FIG. 16C

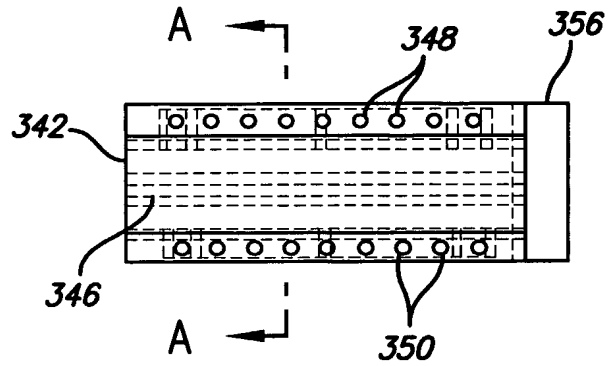


FIG. 16B

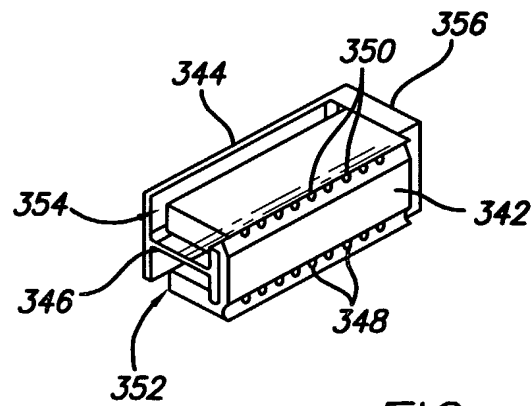


FIG. 16D

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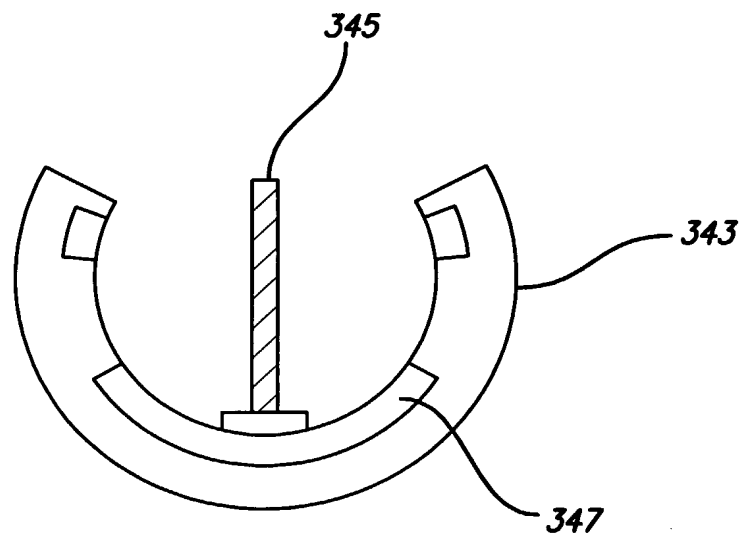


FIG. 16E



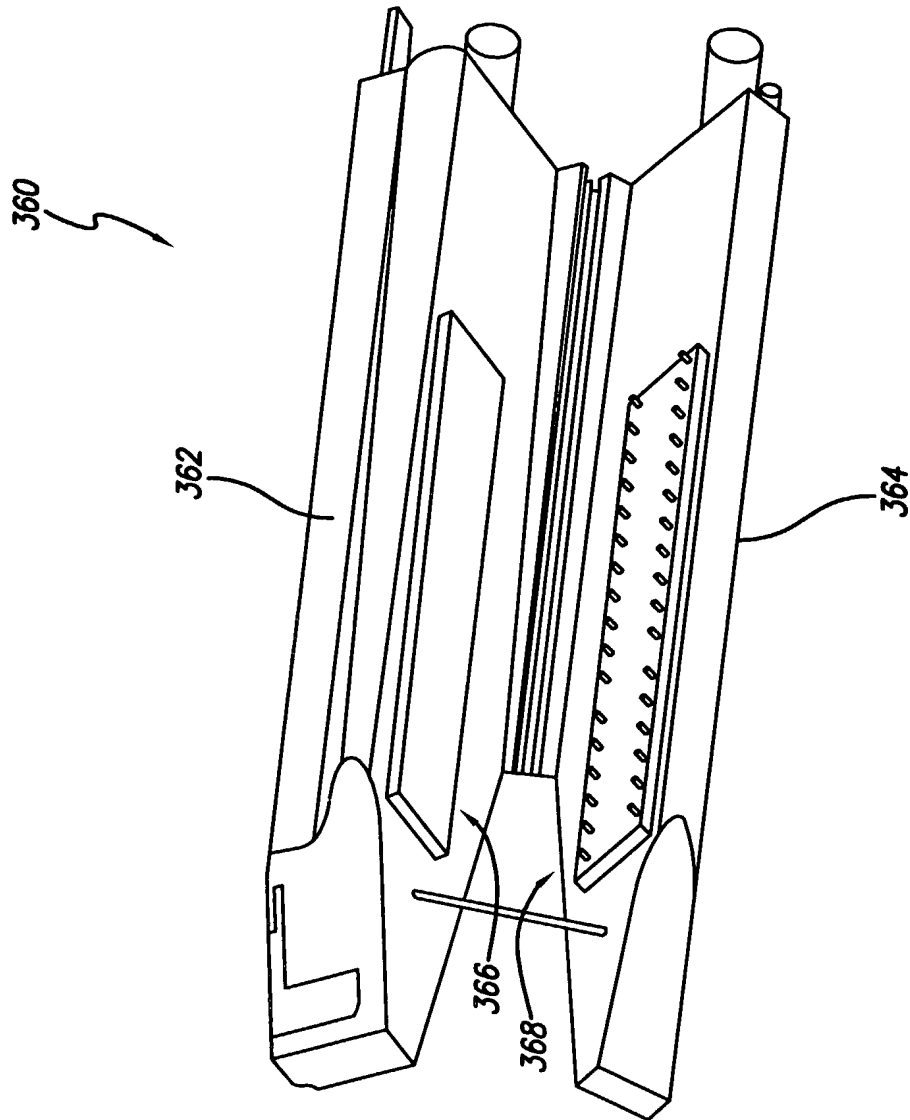


FIG. 17

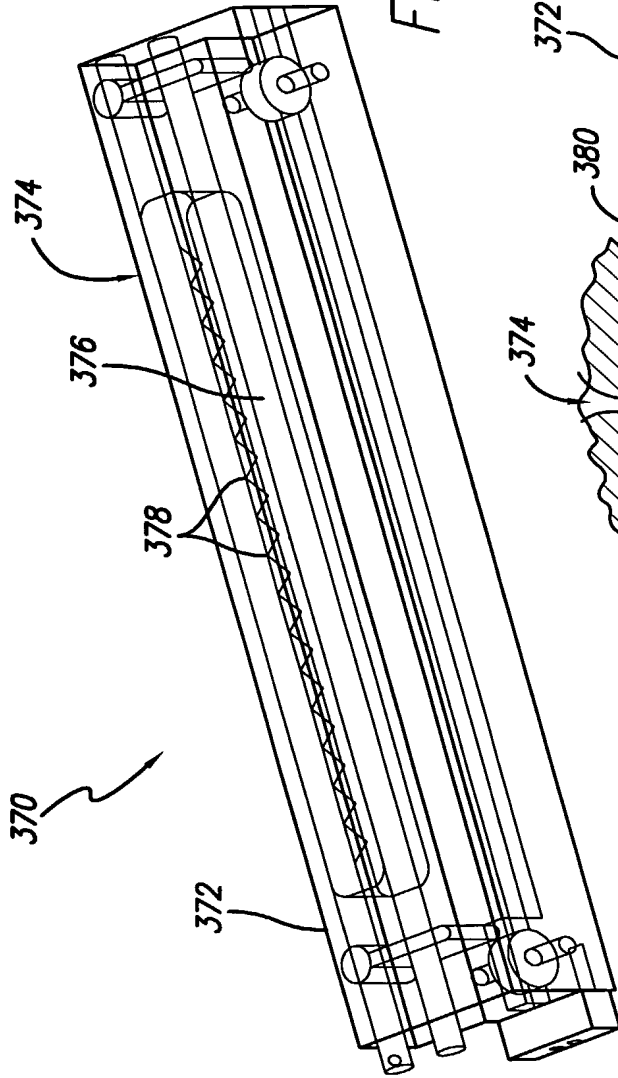


FIG. 18A

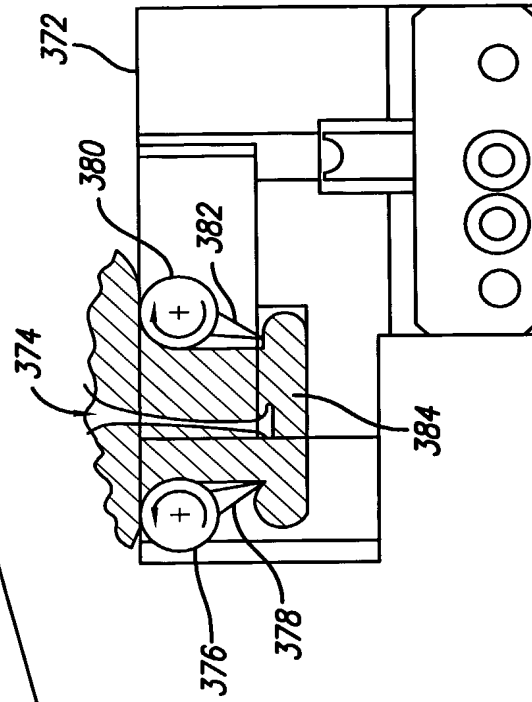


FIG. 18B

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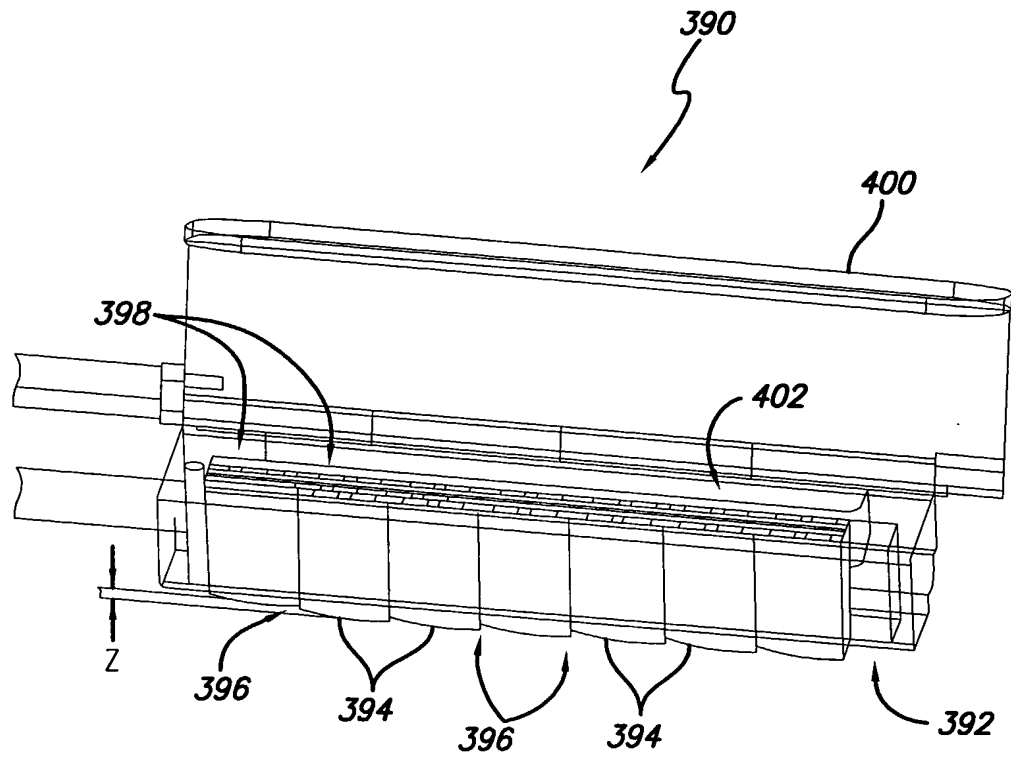


FIG. 19A

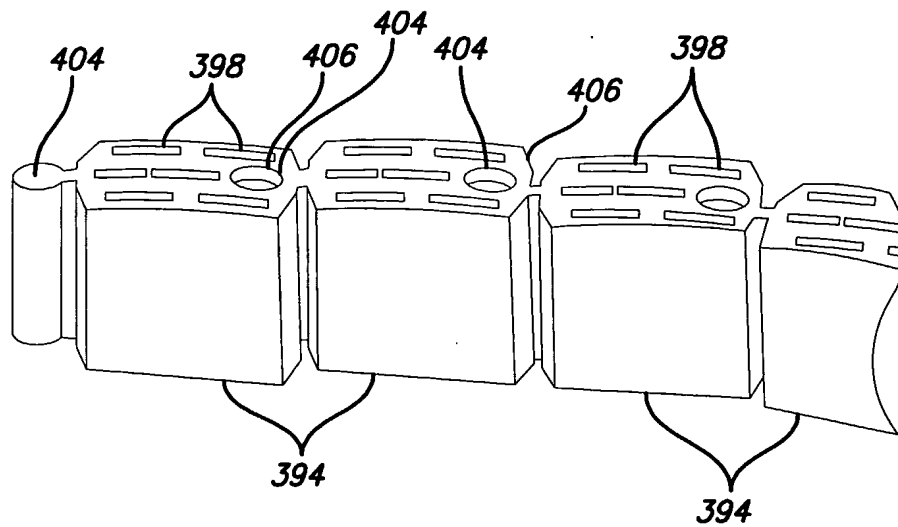


FIG. 19B

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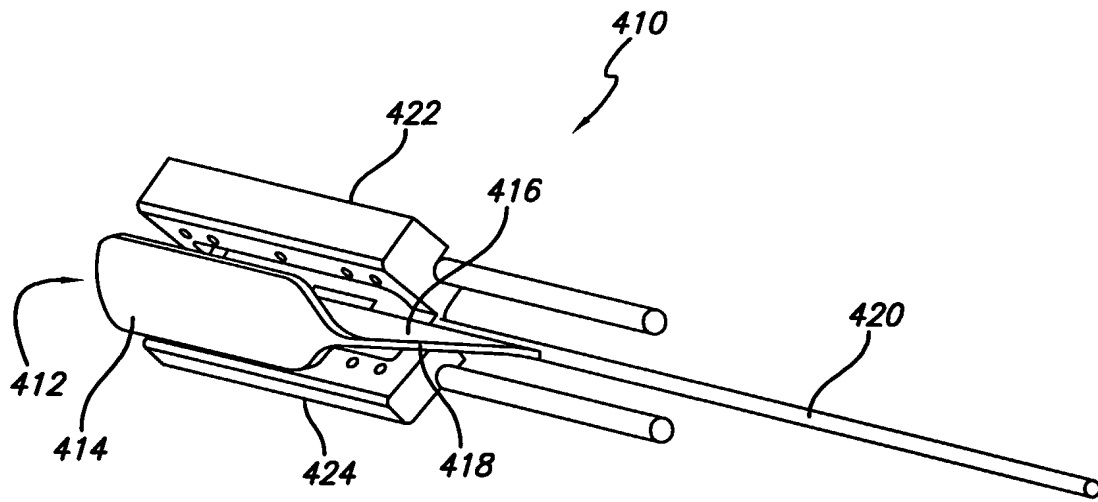


FIG. 20A

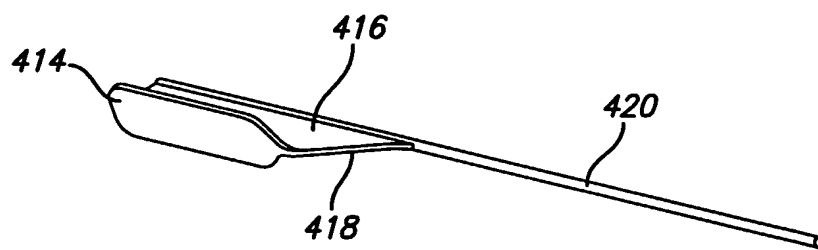
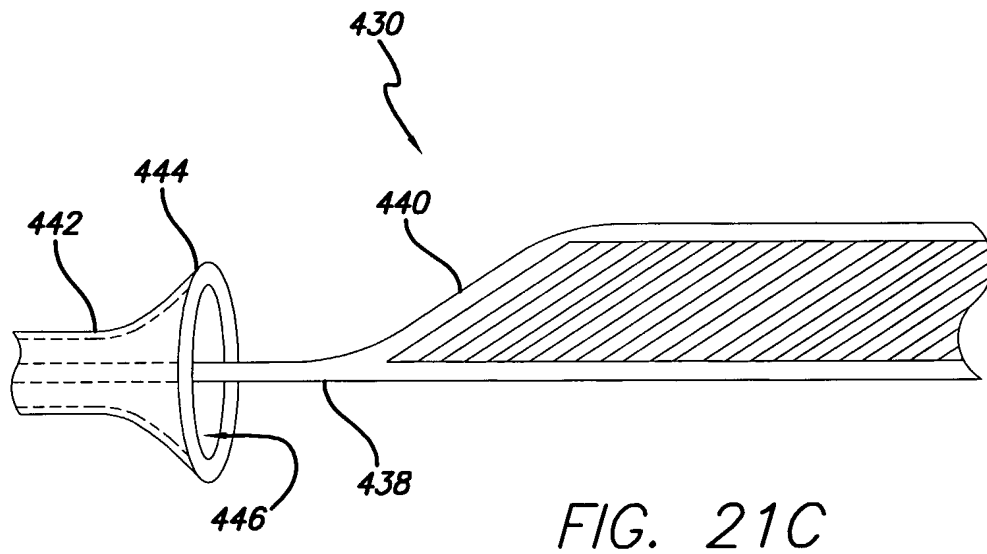
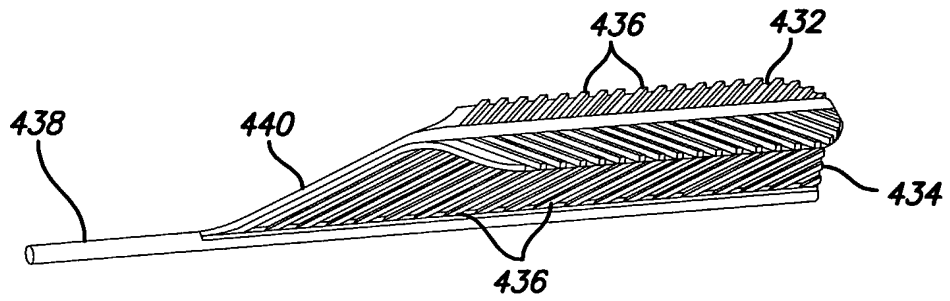
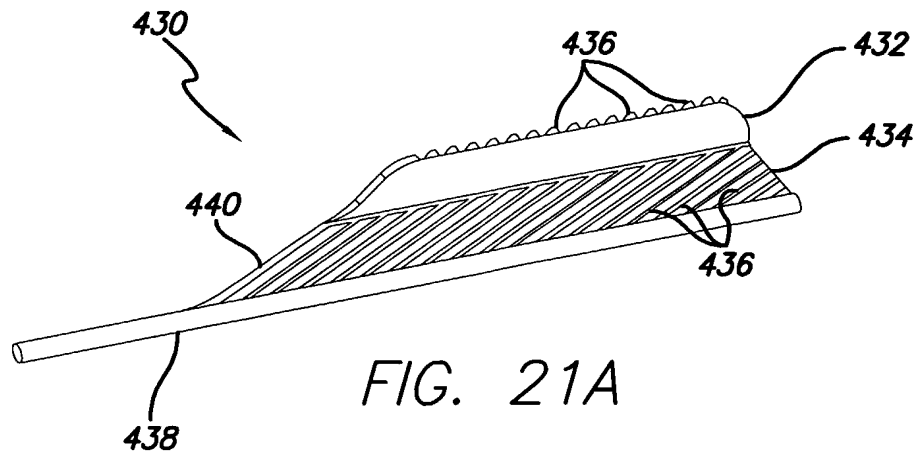


FIG. 20B

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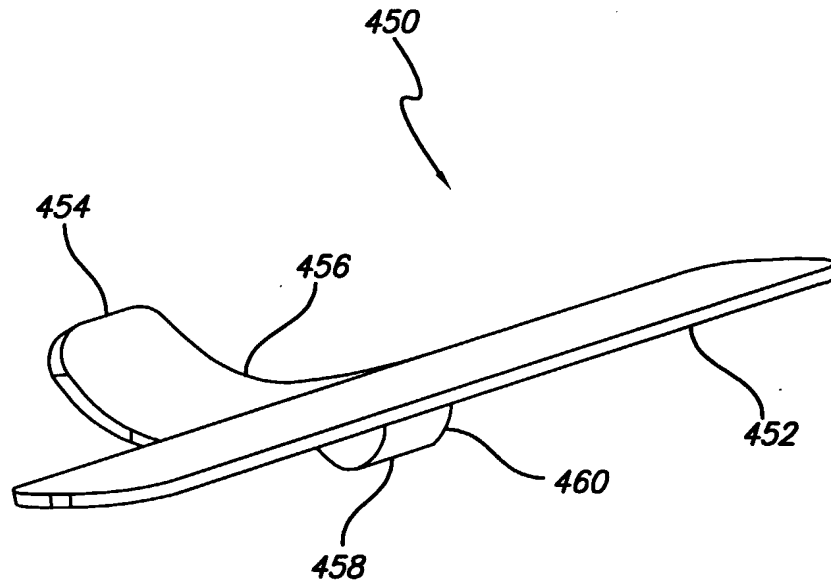


FIG. 22A

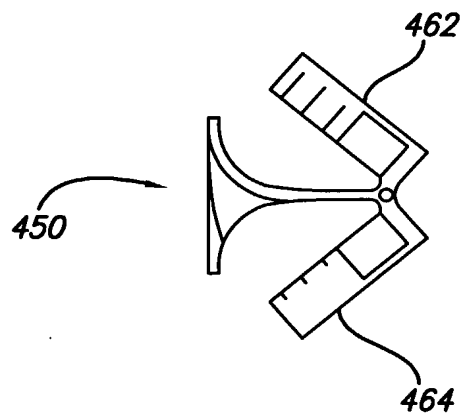


FIG. 22B

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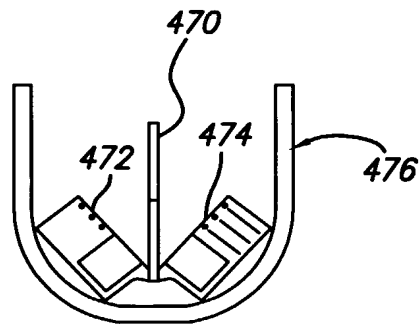


FIG. 23A

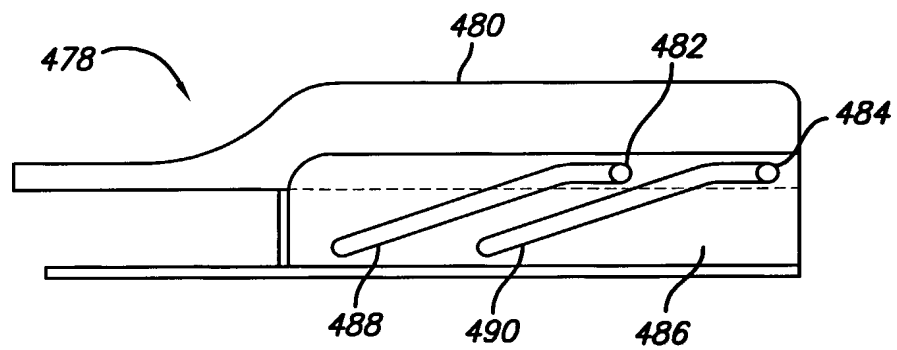


FIG. 23B

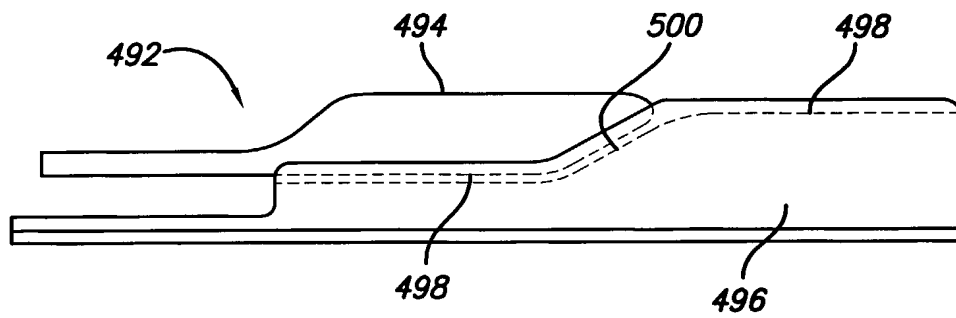


FIG. 23C

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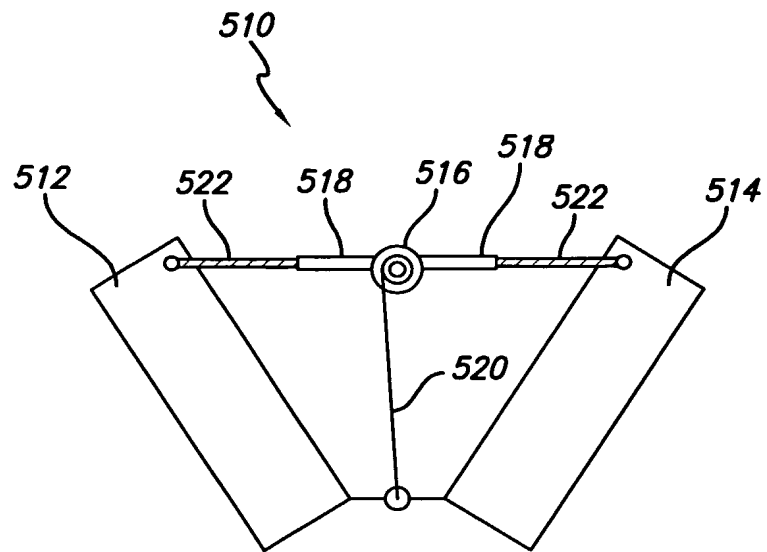


FIG. 24A

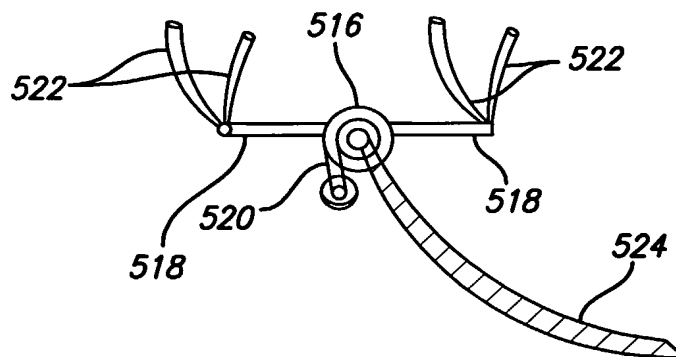


FIG. 24B



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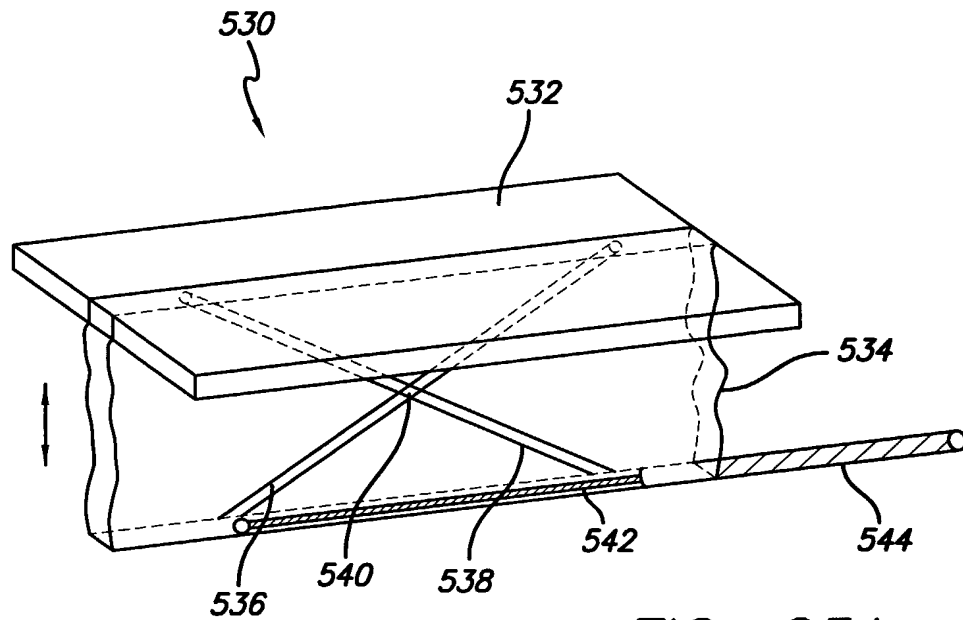


FIG. 25A

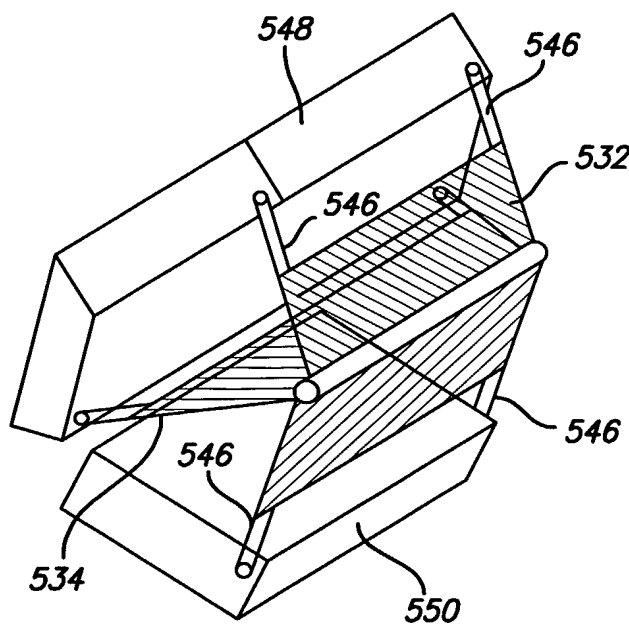


FIG. 25B

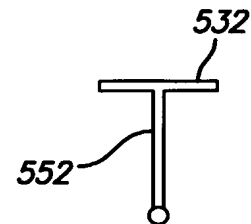


FIG. 25C

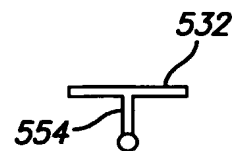


FIG. 25D

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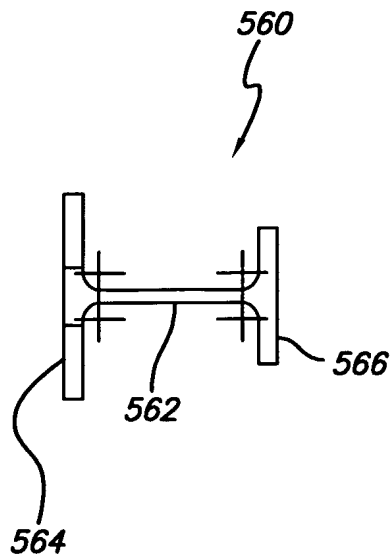


FIG. 26A

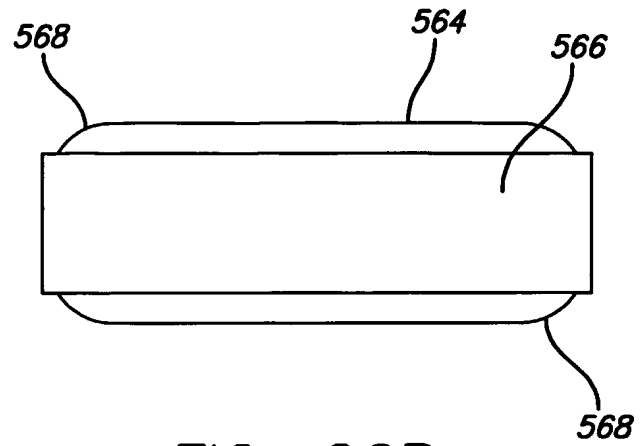


FIG. 26B

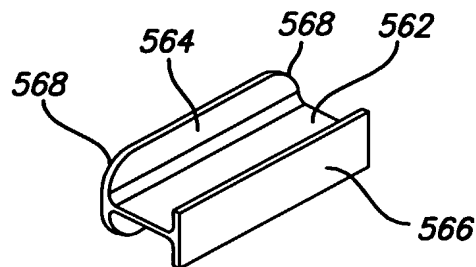
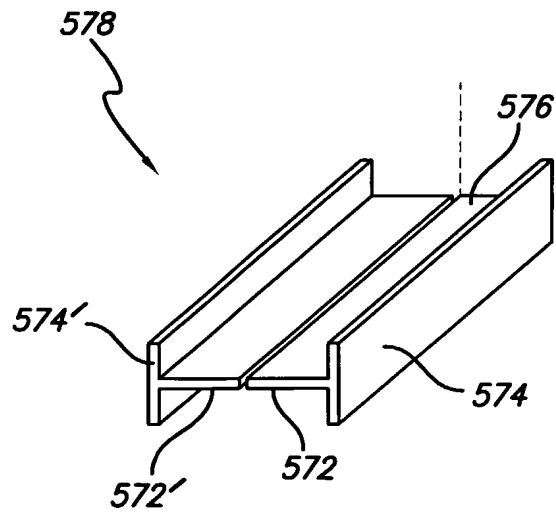
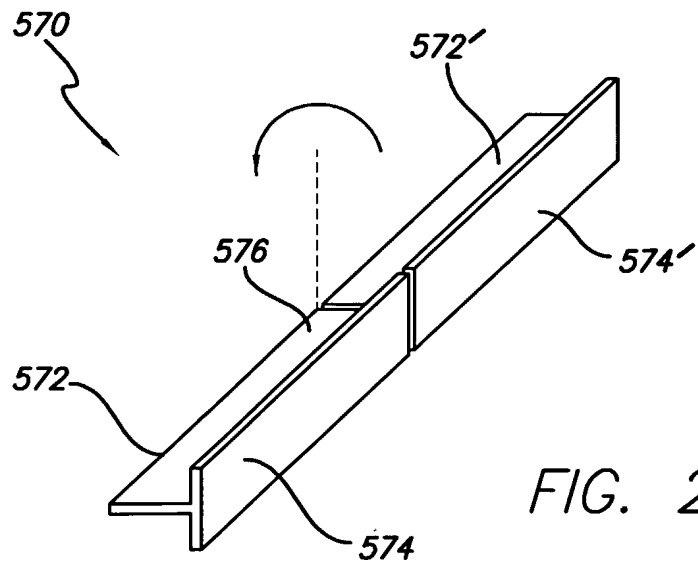


FIG. 26C



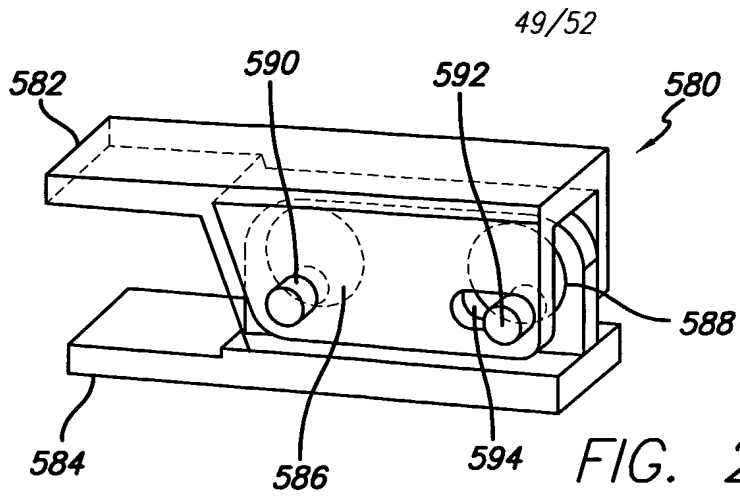


FIG. 28A

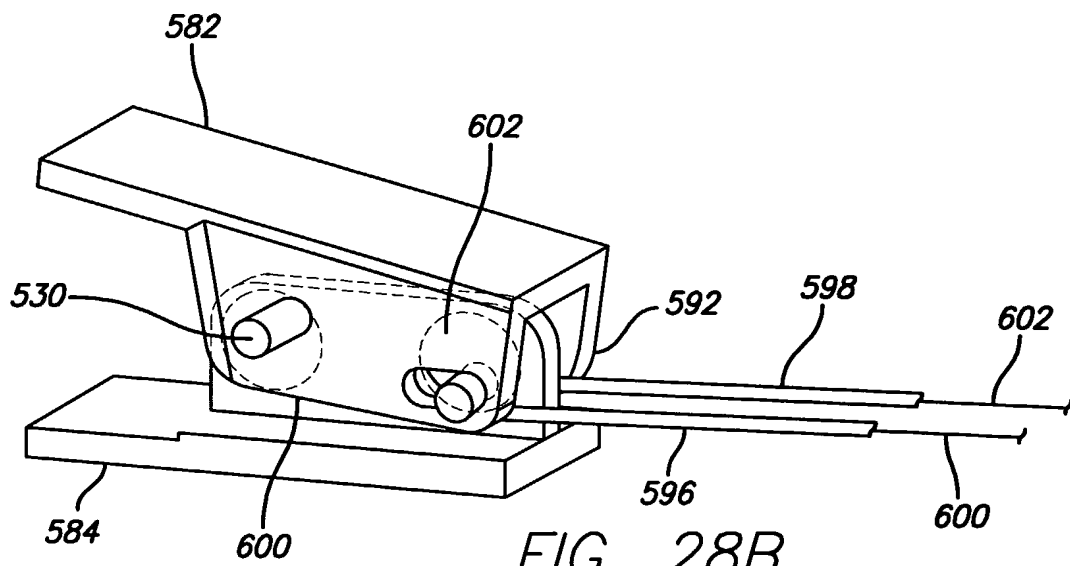


FIG. 28B

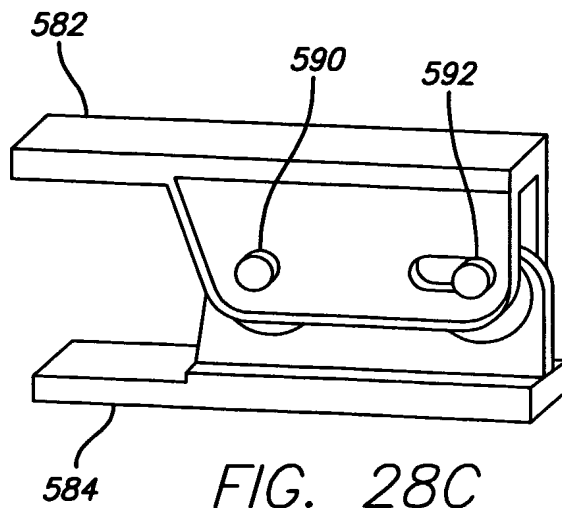
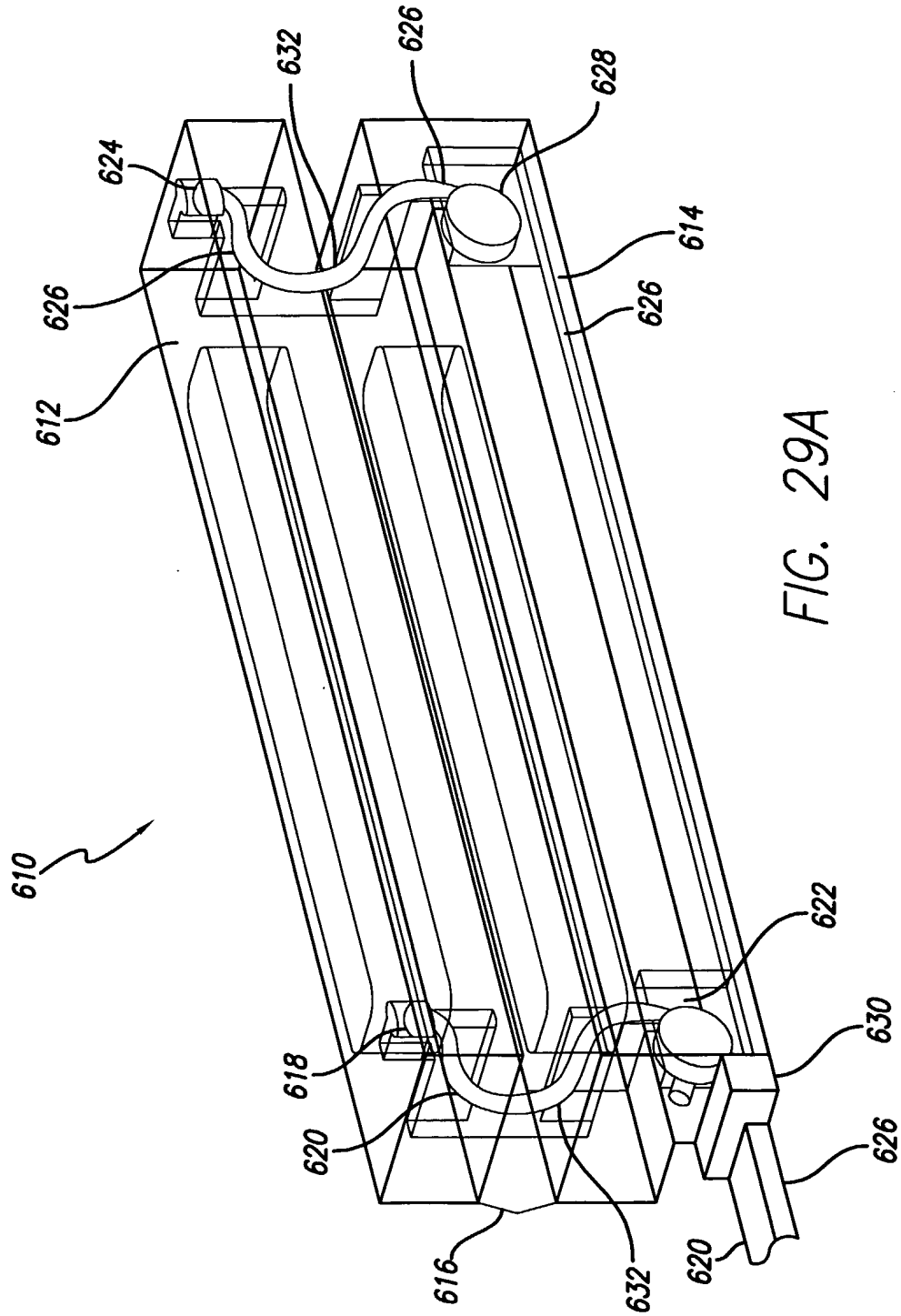


FIG. 28C

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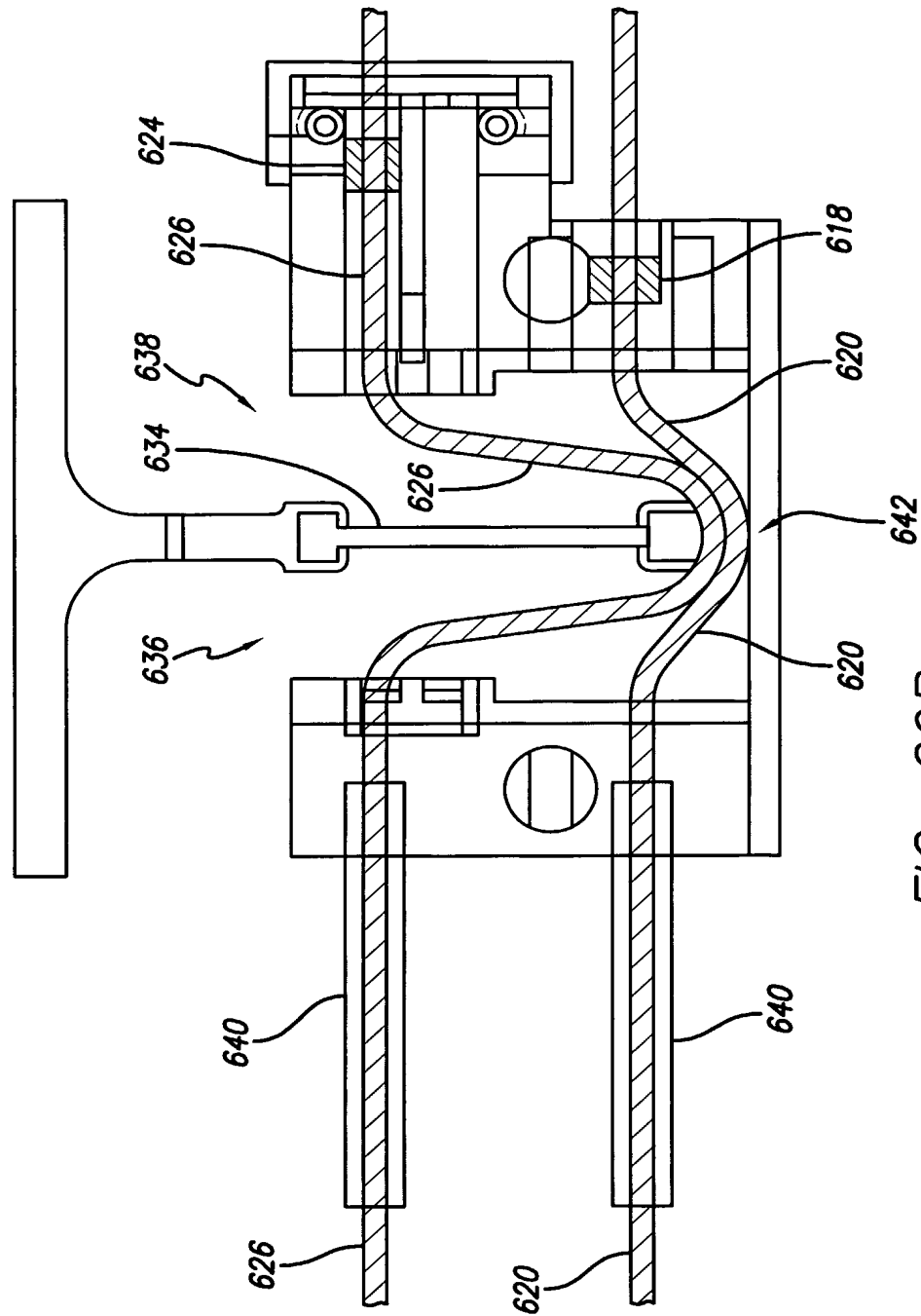
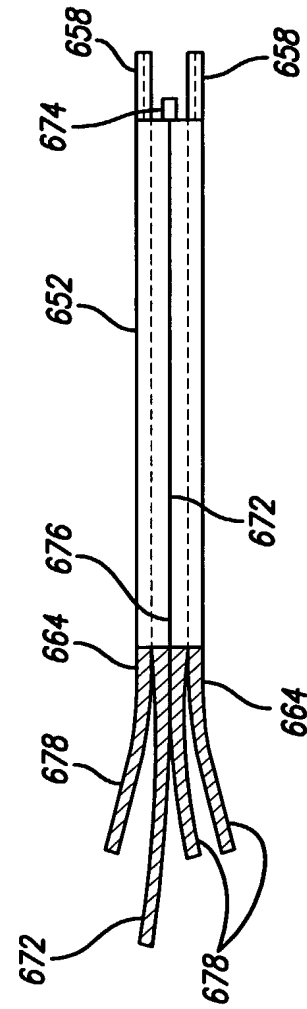
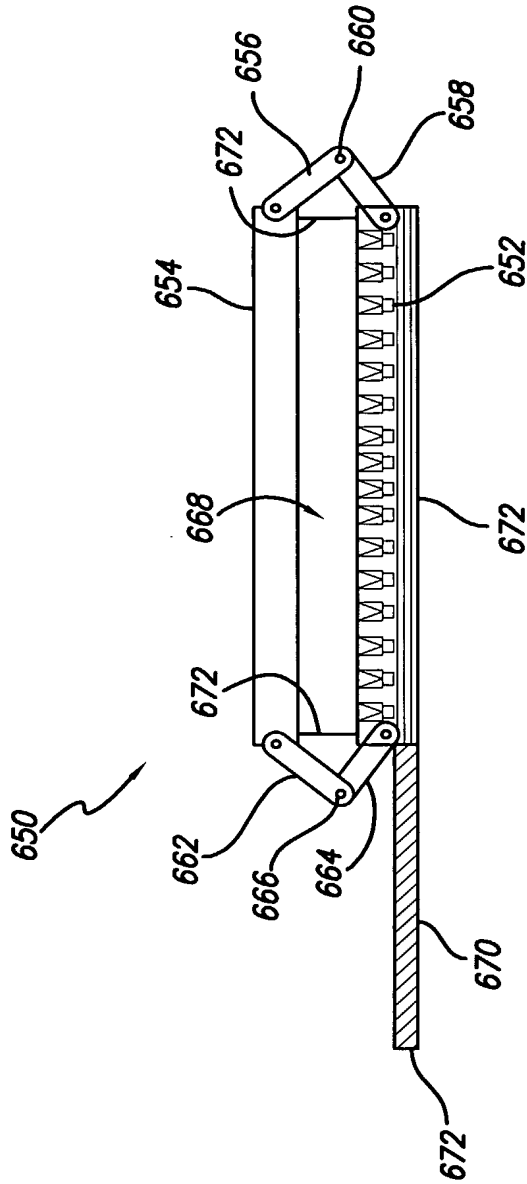


FIG. 29B



# INTERNATIONAL SEARCH REPORT

International Application No  
PC/US2005/004697

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 A61B17/068 A61B17/072 A61F5/00 A61B17/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 7 A61B A61F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EP0-Internal		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/183768 A1 (DEEM MARK E ET AL) 5 December 2002 (2002-12-05)	1-13, 21-24, 27-50, 53,55,58
A	page 6, paragraph 99 - page 7, paragraph 110 figures 10-14	14
X	US 2003/132267 A1 (ADAMS RONALD D ET AL) 17 July 2003 (2003-07-17)	1-5, 28-33, 38, 40-48, 50,53,58
	page 9, paragraph 112 - page 11, paragraph 125 figures 21-26	
<input type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
Date of the actual completion of the international search <div style="text-align: center;">9 May 2005</div>		Date of mailing of the international search report <div style="text-align: center;">22 JUL 2005</div>
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer <div style="text-align: center;">Compos, F</div>



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2005/004697

### Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1-24, 27-50, 53, 55, 58

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-24,27-50,53,55,58

A gastroplasty stapler having a stapling head comprising two stapling jaws hinged longitudinally relative to the device, said jaw assembly having a septum between the two jaws, wherein the septum has a first portion extending longitudinally along the line of the jaw hinge, and a second portion in a transverse direction. The resulting generally T-shaped septum allows the stomach wall tissue to be properly positioned in the jaw assembly for fastening.

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2. claims: 1,6,25,26,45,49,56,57

A gastroplasty stapler having a stapling head comprising two stapling jaws hinged longitudinally relative to the device, said jaw assembly having a septum between the two jaws, wherein the septum is made of a bioabsorbable material such that after use, it can be left in the patients stomach to be broken down.

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3. claims: 45,51,52

Gastroplasty device having a distal assembly for acquiring tissue and thus forming a gastric pouch, said device also comprising an expandable element to stretch the stomach to provide more operating space.

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4. claims: 45,54

Gastroplasty device having a distal assembly for acquiring tissue and thus forming a gastric pouch, said device also comprising a transducer to provide some degree of feedback to the practitioner with regard to how much pressure is being applied by the distal assembly to the stomach tissue.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002183768 A1	05-12-2002	BR 0210900 A CA 2448961 A1 EP 1389984 A1 JP 2005515799 T WO 02096327 A2 US 2003065359 A1 US 2003120265 A1 US 2003109892 A1 US 2004024386 A1 US 2004122452 A1 US 2004122453 A1	01-03-2005 05-12-2002 25-02-2004 02-06-2005 05-12-2002 03-04-2003 26-06-2003 12-06-2003 05-02-2004 24-06-2004 24-06-2004
US 2003132267 A1	17-07-2003	US 2002020732 A1 US 6241140 B1 US 6179195 B1 US 6126058 A US 2004232198 A1 WO 02083008 A2 US 2003127491 A1 US 2004134964 A1 AU 3975702 A EP 1328197 A2 JP 2004512892 T WO 0238037 A2 US 2002063143 A1 US 2003019905 A1 US 2003192937 A1 US 2004049096 A1 US 6343731 B1 US 2002047036 A1 US 2003018236 A1 US 2005065398 A1 AU 761832 B2 AU 3998399 A AU 2003246076 A1 CA 2333690 A1 EP 1091695 A1 JP 2002543911 T WO 0069344 A1	21-02-2002 05-06-2001 30-01-2001 03-10-2000 25-11-2004 24-10-2002 10-07-2003 15-07-2004 21-05-2002 23-07-2003 30-04-2004 16-05-2002 30-05-2002 30-01-2003 16-10-2003 11-03-2004 05-02-2002 25-04-2002 23-01-2003 24-03-2005 12-06-2003 05-12-2000 09-10-2003 23-11-2000 18-04-2001 24-12-2002 23-11-2000